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FMFM 5-4

OFFENSIVE AIR SUPPORT

DEPARTMENT OF THE NAVY • UNITED STATES MARINE CORPS •

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13 September 1979

FOREWORD

1. PURPOSE

This publication, FMFM 5-4, Offensive Air Support, sets forth doctrine, tactics, and techniques to be employed in operations and training involving offensive air support within the Fleet Marine Force.

2. SCOPE

This manual expands the doctrine, tactics, and techniques applicable to the employment of tactical air for offensive air support contained in FMFM 5-1, Marine Aviation. Specific guidance is provided for air control in close air support. This manual also contains detailed information on attack aircraft, ordnance, and weapons effectiveness.

3. CHANGES

Recommendations for improving this manual are invited from commands as well as directly from individuals. The attached User Suggestion Form should be utilized by individuals and forwarded to the Commanding General, Marine Corps Development and Education Command (Code D 036), Quantico, Virginia 22134.

4. CERTIFICATION

Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

J. H. Miller
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From:

To: Commanding General, Marine Corps Development and Education Command
(Code D 036), Quantico, Virginia 22134

Subj: FMFM 5-4, Offensive Air Support; recommendation concerning

1. In accordance with the Foreword to FMFM 5-4, which invites individuals to submit suggestions concerning this FMFM directly to the above addressee, the following unclassified recommendation is forwarded:

____	____________	______	____________
Page	Article/Paragraph No.	Line No.	Figure/Table No.

Nature of Change: ___ Add ___ Delete ___ Change ___ Correct

1. Proposed New Verbatim Text: (Verbatim, double spaced; continue on additional pages as necessary.)

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OFFENSIVE AIR SUPPORT

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CHAPTER 1

FUNDAMENTALS OF OFFENSIVE AIR SUPPORT

Section I. INTRODUCTION

1101. GENERAL

a. One of the most effective uses of aircraft is to deliver firepower against the enemy. This is an especially valuable capability when artillery support is not available. Prior to and during the actual landing of troops and cargo in an amphibious operation, the ground commander relies extensively on naval gunfire (NGF) and air support. Although artillery eventually replaces naval gunfire as the operation progresses inland, air support continues to be a vital asset for the ground commander to exploit at every opportunity.

b. The needs of the ground commander and the scheme of maneuver will dictate the types of offensive air support conducted. Generally, there are two categories of offensive air support: close air support (CAS) and deep air support. Offensive air support does not include attacks against enemy aircraft or their supporting facilities. These operations are a function of antiair warfare and are discussed in FMFM 5-5, Antiair Warfare.

1102. HISTORICAL EVOLUTION

a. The Marine Corps was introduced to offensive air support in the closing weeks of World War I. The U.S. Marine Corps Northern Bombing Group dropped 14 tons of bombs behind enemy lines from 14 October to 11 November 1918. Subsequently, there was very little activity in the use of Marine aircraft as an offensive weapon until the "Banana Wars" in the 1920's. During the Nicaraguan campaign, the Marine Corps used aircraft for support of ground troops on several occasions and it was at this time that the air/ground team was conceived. Although the development of close air support did not make significant progress until several years later in World War II, the events of the 1930's gave Marine aviation firm footing in the Marine Corps mission. The development of the Fleet Marine Force in 1933, the establishment of Marine air as a separate section under the Commandant of the Marine Corps in 1935, and the assignment of a mission for Marine aviation in 1939 all paved the way for the air/ground team which we know today.

b. Offensive air support during World War II primarily consisted of the bombing of enemy air and naval bases and supporting amphibious landings. As control measures improved and aviators gained more experience, close air support was employed more frequently and with greater effectiveness. During the Okinawan campaign, close air support played a critical role and was employed more efficiently than in any other Central Pacific operation. During one campaign, over 14,000 close support sorties were flown by carrier and land based aircraft. By the end of World War II, offensive air support was well established as a function of Marine aviation.

c. Offensive air support was used extensively during the conflicts in Korea and Vietnam. The sophisticated electronic equipment developed during the Vietnam war allowed CAS and direct air support to be performed during all weather conditions, including periods of darkness. The advent of "smart bombs" such as television and laser-guided weapons has significantly increased the capabilities for Marine aviation to support the ground troops in both the deep and close air support roles. The advances that the Marine Corps has gained in offensive air support have greatly contributed to the Marine air-ground team concept.

1103. FUNCTION OF OFFENSIVE AIR SUPPORT

Offensive air support are those air operations which deliver firepower against enemy installations, facilities, and personnel. They are conducted to directly assist the attainment of ground objectives in the amphibious operation area by destruction of enemy resources or the isolation of his military force. Offensive air support may be subdivided by categorizing operations according to the degree of coordination required with the ground combat element. These categories, deep and close air support, are discussed later in the text. The objectives of offensive air support are neutralization and destruction.

a. Neutralization.--Neutralization missions are designed to render areas, weapons, or enemy forces ineffective. Typical missions may be conducted to provide temporary neutralization of hostile fires on or near a landing force terrain objective and to furnish protection to a helicopterborne force along their approach and retirement routes. Other missions may include attacks against installations or areas to which the enemy requires frequent access to support his combat activity.

b. Destruction.--All tactical air support missions, whose primary purpose is to destroy, are considered destruction missions. They are conducted for the broad purpose of destroying the enemy, his equipment and supplies, his installations, and personnel. Destruction missions are of primary interest to the commander landing force (CLF). Their nature changes as the operation progresses. Initial emphasis is given to isolating the enemy forces in the objective area from their sources of reinforcement and logistic support. Later, emphasis shifts to destruction of the enemy's ground forces in the immediate battle area. While complete destruction is the ideal objective of all offensive air support, it is often prohibitive in terms of the number of sorties and the amount/types of ordnance required. Therefore, destruction missions are frequently restricted to personnel and high priority installations. Neutralization missions are directed toward the remaining targets.

1104. FUTURE CONSIDERATIONS

a. Marine aviation has experienced relatively uncontested skies since World War II. American air superiority in Korea and Vietnam enhanced air support of ground troops; however, extensive on-call support may not be possible in future wars. The advent of small, mobile surface-to-air missiles (SAM's) poses a formidable threat to low flying aircraft, especially helicopters and slow fixed-wing reconnaissance aircraft. The recent wars in the Middle East have demonstrated the tremendous effect these missiles can have on the conduct of air and land battles. It is now possible for air superiority to be attained with missiles alone. It may be that, in the future, missiles will become so sophisticated and accurate that offensive air support with manned aircraft will become too costly or impossible. Countermeasures in the form of tactics, techniques, and electronic warfare must be developed on a continuing basis if the ground commander is to receive the support he has experienced in the past.

b. Close air support plays a critical role in the amphibious operation. The initial landing of troops is heavily dependent upon naval gunfire and close air support until artillery is placed ashore. Even after the operation progresses inland, the relatively light artillery of the Marine air-ground task force (MAGTF) relies upon aircraft to deliver heavy ordnance on the enemy, both close in and beyond the fire support coordination line (FSCL). Whatever the future holds, this firepower must be available or the success of any amphibious assault may be in question.

Section II. TERMINOLOGY

1201. GENERAL

This section provides an abbreviated list of terms often encountered in Marine aviation and which are especially useful in understanding offensive air support. Familiarity with the terms and their meanings provide a key to this subject and will also provide a better understanding of Marine aviation in general.

1202. REFERENCES

The terms in this section and throughout this publication are consistent with other Fleet Marine Force Manuals (FMFM's). Specifically, JCS Pub 1, Department of Defense Dictionary for Military and Associated Terms; NWP 3, Naval Terminology; and LFM 01, Doctrine for Amphibious Operations, provide the primary references for the entire aviation FMFM series. Throughout this manual, the use of quotation marks without specific reference indicates a definition quoted from JCS Pub 1, or that the meaning of the term is as defined in JCS Pub 1.

1203. DEFINITIONS

a. Airborne Forward Air Controller (AFAC).--"A specifically trained and qualified tactical fighter pilot to perform dual tasks of conducting aerial reconnaissance/surveillance and of exercising control from the air of aircraft engaged in close air support of ground troops." (LFM 01)

b. Air Interdiction.--"Air operations conducted to destroy, neutralize, or delay the enemy's military potential before it can be brought to bear effectively against friendly forces, at such distance from friendly forces that detailed integration of each air mission with the fire and movement of friendly forces, is not required."

c. Armed Reconnaissance.--"A mission with the primary purpose of locating and attacking targets of opportunity; i.e., enemy material, personnel, and facilities, in assigned general areas or along assigned ground communications routes, and not for the purpose of attacking specific briefed targets."

d. Close Air Support.--"Air attacks against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fire and movement of those forces."

e. Deep Air Support.--Air action conducted against enemy targets which does not require detailed integration of each mission with the fire and movement of friendly ground forces. Deep air support missions are normally conducted beyond the FSCL.

f. Direct Air Support.--Air support provided as a direct response to a request by the supported unit. It may include offensive air support, assault support, reconnaissance, early warning, or such other forms of air support as may be requested.

g. Forward Air Controller (FAC).--"An officer member of the tactical air control party who, from a forward ground or airborne position, controls aircraft engaged in close air support of ground troops." (JCS Pub 1) "When the FAC is airborne, he is termed AFAC." (LFM 01)

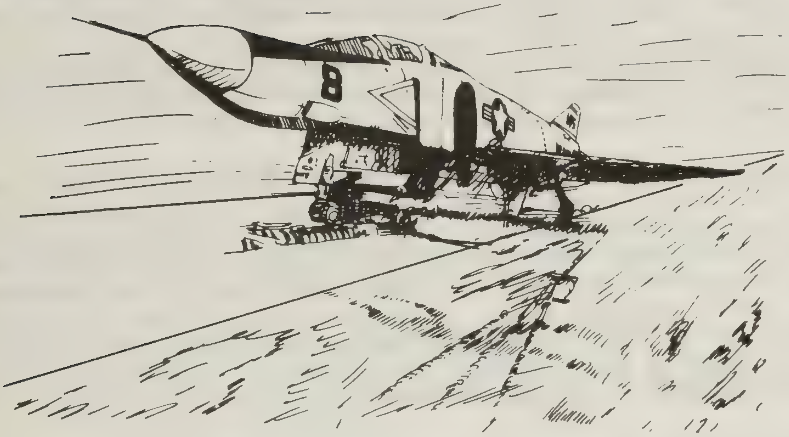
h. Immediate Air Support.--"Air support to meet specific requests which arise during the course of a battle and which, by their nature, cannot be planned in advance."

i. Naval Aviation Observer (NAO).--An airborne observer/controller whose mission is to observe or take photographs, adjust and spot for artillery and naval gunfire, control close air support strikes, and to assist in the coordination of supporting fires.

j. Preplanned Mission.--An airstrike on a target which can be anticipated sufficiently in advance to permit detailed mission coordination and planning.

k. Tactical Air Control Party (TACP).--"A subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft."

l. Tactical Air Coordinator (Airborne) (TAC(A)).--"An officer who coordinates, from an aircraft, the action of combat aircraft engaged in close support of ground or sea forces."



CHAPTER 2

ORGANIZATIONS AND MISSIONS

Section I. INTRODUCTION

2101. GENERAL

This section describes the offensive air support means found in the Marine aircraft wing (MAW), Marine aircraft group (MAG), and in appropriate aviation squadrons. Specific missions and tasks are listed in FMFM 5-1, Marine Aviation, but will be reiterated when necessary to provide a better understanding of this function of Marine aviation.

2102. MARINE AIRCRAFT WING

The elements within the MAW tasked with the offensive air support role are the VMA, VMFA, VMA(AW), and HMA squadrons. The offensive air support role of the HMA is discussed in FMFM 5-3, Assault Support. Other squadrons support this effort such as VMGR (air refueling) and VMO (AFAC/NAO), but this section will be primarily concerned with the squadrons tasked with ordnance delivery. It should be noted, however, that all elements of the MAW mutually support each other while performing their respective tasks. This includes, not only aircraft squadrons, but the many support elements such as Marine air base squadrons (MABS), headquarters and maintenance squadrons (H&MS), Marine air control squadrons (MACS), engineer squadron, transportation squadron, headquarters and ground maintenance squadrons (H&GMS's), and air support radar teams (ASRT's).

2103. MARINE AIRCRAFT GROUP (VMA/VMFA)

The mission of the MAG(VF/VA) is to conduct antiair warfare and offensive air support operations in support of Fleet Marine Forces from advanced bases, expeditionary airfields, or aircraft carriers and conduct such other air operations as may be directed. Each fixed-wing MAG has a headquarters and maintenance squadron and an air base squadron. The remainder of the group is task organized to provide the capability to perform commitments assigned. The concept of task organizing aircraft groups, whether in training or combat, provides significant flexibility in assignment of assets and the opportunity to structure units to do a specific job and meet specific situations. Examples of the MAG(VF/VA) aircraft squadron mix and the rationale for each composition follows:

a. First Example.--Either structure shown would provide considerable air support with three attack (VMA) squadrons (48-60 aircraft), the MAG would be capable of providing all categories of offensive air support and contribute to the antiair warfare effort. Three fighter/attack (VMFA) squadrons (36 aircraft) provide an excellent air-to-air intercept capability for the antiair warfare (AAW) function and an adequate offensive air support capability. Both structures would have the advantage of ease of maintenance and supply by reducing the different types of aircraft to be supported and missions to be performed:

MAG Headquarters	VMA		VMFA
H&MS	VMA	or	VMFA
MABS	VMA		VMFA

b. Second Example.--Either mix chosen in this example would have the advantage of an all-weather attack (VMA(AW)) capability added to the capabilities mentioned in the first example. Having more than one type of aircraft in each structure would add to the group supply and maintenance effort:

MAG Headquarters	VMA		VMFA
H&MS	VMA	or	VMFA
MABS	VMA(AW)		VMFA
	VMA(AW)		VMA(AW)

c. Third Example.--This structure enhances the capability to conduct all categories of antiair warfare and offensive air support operations. A group so structured, however, would have tremendous complexities of supply and maintenance, even though it might provide the most desirable tactical composition. This would be especially true if this group was assigned to operate independently from other aviation units. The supply and maintenance problems stem from the complexity of modern combat aircraft and the unique support equipment required. Complex radars, airborne weapons control systems, power plants, air frames, electronic devices, test equipment, as well as the personnel and their training programs vary considerably with types of aircraft and missions of squadrons. Graphically, the basic components of the MAG(VF/VA) would be as shown in figure 1:

MAG Headquarters	VMA (A-4 type aircraft)
H&MS	VMA (AV-8 type aircraft)
MABS	VMA(AW) (A-6 type aircraft)
	VMFA (F-4 type aircraft)

d. Tasks Assigned to a Fixed-Wing MAG

(1) Conduct antiair warfare and offensive air operations in support of Fleet Marine Forces and such other air operations as may be directed.

(2) Maintain the capability to deploy and operate from aircraft carriers, advanced bases, and expeditionary airfields.

(3) Conduct, supervise, and coordinate such training for individuals and units as required to qualify assigned squadrons for tactical deployment and combat operations.

(4) Maintain the capability of manning and operating expeditionary airfields.

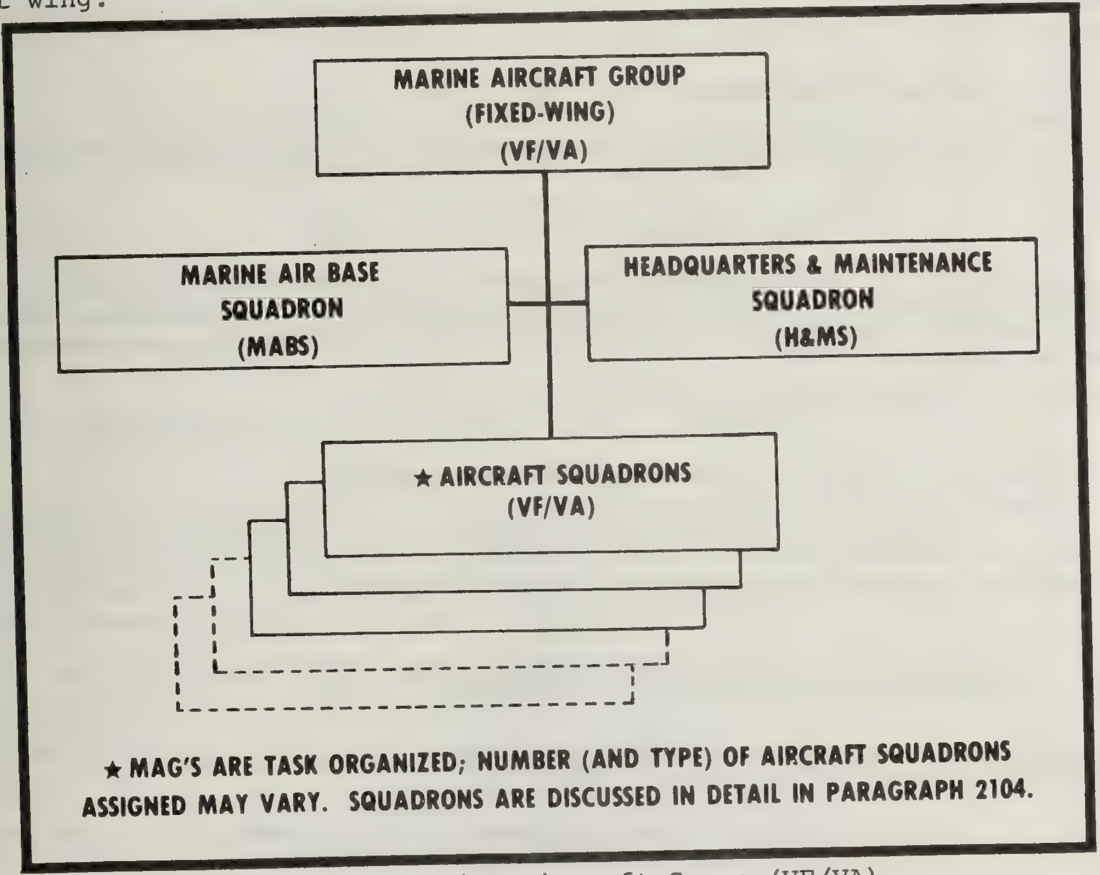
(5) Augment shore establishments, when based thereon, with personnel and equipment as directed by appropriate authority.

(6) Coordinate air-sea rescue services at advanced bases.

(7) Coordinate requirements for ground defense with appropriate commands when in a separate location.

(8) Provide for the internal security of assigned areas.

(9) Maintain the capability to plan and conduct nuclear and chemical weapons delivery, utilizing weapons compatible with assigned aircraft when deployed and not under the operational control of a Marine aircraft wing.


MARINE AIRCRAFT GROUP (FIXED-WING) (VF/VA)
MARINE AIR BASE SQUADRON (MABS)
HEADQUARTERS & MAINTENANCE SQUADRON (H&MS)
★ AIRCRAFT SQUADRONS (VF/VA)

★ MAG'S ARE TASK ORGANIZED; NUMBER (AND TYPE) OF AIRCRAFT SQUADRONS ASSIGNED MAY VARY. SQUADRONS ARE DISCUSSED IN DETAIL IN PARAGRAPH 2104.

Figure 1.--Marine Aircraft Group (VF/VA).

(10) Direct, collect, process, and disseminate intelligence information in coordination with appropriate agencies.

(11) Provide logistics and maintenance support for attached squadrons.

(12) Provide detachments for the support and maintenance of separately deployed units as required.

(13) Provide intermediate calibration (qualification) and repair services for all aeronautical test and measuring equipment assigned to MAG units.

(14) Provide supply, financial, and aircraft maintenance automatic data processing (ADP) support in accordance with current OPNAV, NAVSUP, and Marine Corps directives.

2104. MARINE SQUADRONS

The squadron is the basic tactical and administrative echelon of Marine aviation. The relationship of a squadron to other wing organizations is similar to the relationship of an infantry battalion to the Marine division. The squadron is normally commanded by a lieutenant colonel. Functions, missions, and tasks are assigned by the table of organization (T/O); it is the largest aviation unit in the Marine Corps organized with a fixed T/O.

a. Aircraft Squadrons

(1) Marine Attack Squadron, Marine Aircraft Group.--The Marine attack squadrons are of three types: A-4, AV-8, or A-6.

(a) Marine Attack Squadron (VMA)(A-4)

1 Mission.--The mission of the VMA(A-4) squadron is to attack and destroy surface targets under daylight visual flight rules (VFR) conditions, escort helicopters, and conduct such other air operations as may be directed.

2 Tasks

a Conduct close air support.

b Conduct armed reconnaissance, interdiction operations, and strikes against enemy installations, utilizing all types of conventional, nuclear, and chemical weapons compatible with assigned aircraft.

c Provide smoke laying, night battlefield or target illumination, and insecticide spraying.

d Maintain the capability of deployment or extended range operation employing aerial refueling.

e Perform organizational maintenance on assigned aircraft.

f Maintain the capability to perform emergency resupply mission compatible with assigned aircraft.

g Conduct armed escorts in support of helicopter operations.

h Maintain the capability of deploying and operating from aboard carriers, advanced bases, and expeditionary airfields (EAF's).

i Maintain the capability to operate during darkness and under instrument flight conditions to include ordnance delivery under the control of ASRT's.

j Conduct air defense operations within capability of aircraft assigned.

(b) Marine Attack Squadron (AV-8)

1 Mission.--The mission of a VMA(AV-8) squadron is to attack and destroy surface targets under daylight VFR conditions, escort helicopters, and conduct such other operations as may be directed.

2 Tasks

a Conduct close air support.

b Conduct armed reconnaissance, interdiction operations, and strikes against enemy installations, utilizing all types of conventional weapons compatible with assigned aircraft.

c Conduct air defense operations within capability of aircraft assigned.

d Maintain capability to operate during darkness and under instrument flight conditions to include ordnance delivery under the control of ASRT's.

e Maintain the capability of deployment or extended operation employing aerial refueling.

f Maintain the capability of deploying and operating from aboard carriers and other suitable seagoing platforms, advanced bases, expeditionary airfields, and remote tactical landing sites.

g Maintain capability to perform emergency resupply missions compatible with assigned aircraft.

h Conduct armed escort missions in support of helicopter operations.

i Perform organizational maintenance on assigned aircraft.

(c) Marine Attack Squadron (All-Weather) (A-6)

1 Mission.--The mission of the all-weather Marine attack squadron is to attack and destroy surface targets under all-weather

conditions, to escort helicopters, and to conduct such other air operations as may be directed.

2 Tasks

a Conduct close air support under all-weather conditions to include ordnance delivery under control of ASRT's.

b Conduct armed reconnaissance, radar search and attack, interdiction operations, and strikes against enemy installations, utilizing all types of conventional, nuclear, and chemical weapons compatible with assigned aircraft, under visual and all-weather conditions.

c Conduct air defense operations within capabilities of aircraft assigned.

d Perform smoke laying, night battlefield or target illumination, and insecticide spraying.

e Maintain the capability to deploy and extend the range of operation by employing aerial refueling techniques.

f Maintain the capability to deploy and operate from aircraft carriers, advanced bases, and expeditionary airfields.

g Maintain the capability to perform emergency resupply missions compatible with assigned aircraft.

h Collect and disseminate information on enemy units within the capability of assigned aircraft.

i Perform organizational maintenance on assigned aircraft.

(2) Marine Fighter/Attack Squadron, Marine Aircraft Group.--The Marine fighter/attack squadron is organized and equipped to perform a dual mission of all-weather interceptor and close air support under visual flight conditions. A VMFA squadron utilizes F-4 aircraft.

(a) Mission.--The mission of the Marine fighter/attack squadron is to intercept and destroy enemy aircraft under all-weather conditions, attack and destroy surface targets, escort friendly aircraft, and conduct such other air operations as may be directed.

(b) Tasks

1 Intercept and destroy enemy aircraft in conjunction with ground and airborne fighter direction.

2 Maintain the capability to attack and destroy surface targets with those conventional weapons compatible with assigned aircraft.

3 Provide fighter escort of friendly aircraft.

4 Perform visual reconnaissance.

5 Conduct close air support operations within the capabilities of assigned aircraft.

6 Maintain the capability of deploying and operating from aboard carriers, advanced bases, and short airfields for tactical support (SATS).

7 Maintain the capability of deployment or extended operation employing aerial refueling.

8 Perform organizational maintenance on assigned aircraft.

b. Support Squadrons

(1) Headquarters and Maintenance Squadron, Marine Aircraft Group

(a) Mission.--The mission of H&MS, MAG is to perform logistic and administrative support for units attached to the MAG.

(b) Tasks

1 Provide intermediate aircraft maintenance for units assigned to the MAG.

2 Perform intermediate and organizational aircraft maintenance.

3 Requisition, store, issue, and account for the appropriate supplies and equipment for supported units.

4 Provide administrative and supply support for the headquarters of the MAG.

5 Screen and repair aeronautical materials in need of rework, test, or check (condition codes B and E).

6 Maintain the capability to deploy as an integral unit or by elements in support of separately deployed units.

7 Conduct individual and unit training as required to qualify organic personnel and supported squadrons for performance of assigned missions and tasks.

8 Provide logistic, administrative, and training flight support for assigned squadrons.

9 Provide postal and disbursing service for assigned squadrons and personnel.

10 Provide base storage and distribution of classes V and V(A) ammunition to supported units.

11 Manufacture pyrogenic products as required for supported units.

12 Provide TAC(A) support if TA-4 aircraft is assigned.

(2) Marine Air Base Squadron, Marine Aircraft Group.--The organization of the wing contains an MABS in each of the tactical Marine aircraft groups. The internal organization and personnel strength of each of the MABS depends upon the type of group, fixed-wing or helicopter, and upon the number and type of tactical squadrons assigned to the parent group. Personnel and equipment for the operation of the Marine air traffic control squadron (MATCS) normally are assigned administratively to the MABS.

(a) Mission.--The mission of the MABS is to provide air base facilities and services (except airfield construction) for the Marine aircraft group or to supplement air base facilities and services provided by a station or facility when based thereon.

(b) Tasks

1 Conduct airfield operations and air traffic control as required for supported units.

2 Provide camp construction, utilities, and maintenance as required for supported units.

3 Provide mess facilities as required for MAG organic units.

4 Provide base storage and distribution for classes I, III, and III(A) supplies to supported units.

5 Provide and operate the base air freight terminal.

6 Maintain the capability to deploy as an integral unit and by elements in support of separately deployed units.

7 Conduct individual and unit training to qualify personnel of MABS and supported squadrons in the performance of required tasks and missions.

8 Provide weather service support as required for supported units.

9 Provide internal and external voice and record communication to the group within capability of communications equipment assigned.

(3) Marine Air Support Squadron, Marine Air Control Group (MASS, MACG).--The Marine air support squadron is organized and equipped to install, maintain, and operate ground communications-electronics facilities required in the operation of the direct air support center (DASC) and three helicopter-transportable air support radar teams. The personnel strength of the squadron includes the necessary aviators, aviation ground officers, and assistants to provide technical direction for aircraft. The squadron is self-supporting in logistic and fiscal functions and carries adequate supplies for independent deployment or for operations at locations apart from its parent air control group.

(a) Mission.--The mission of the MASS is to provide facilities for the control of aircraft operating in close or direct support of Fleet Marine Force operations.

(b) Tasks

1 Receive and coordinate requests for air support.

2 Provide three ASRT's to operate and maintain the facilities required for electronics control of close and direct air support operations.

3 Maintain the capability to accomplish a mission in a situation requiring displacement in echelon.

4 Provide for the operation of the helicopter direction center (HDC).

5 Provide fourth echelon maintenance of Marine Corps-furnished radar equipment and aviation peculiar communications-electronics material items and perform third echelon maintenance of other communications-electronics items and generators, except single sideband.

2105. BATTALIONS, BATTERIES, COMPANIES, AND UNITS

There are two aviation units directly involved in offensive air support. The Marine air tactical control unit which controls aircraft around the home field, and the Marine wing weapons unit (MWWU) which assists the squadrons in the employment of special weapons.

a. Detachment, Marine Air Traffic Control Squadron.--Within the MACCS, expeditionary terminal control facilities are required and the MATCS is and operational facility designed to handle that requirement.

(1) The mission of the MATCS is to direct and control air traffic, including landings and takeoffs, within a designated air traffic control area under all-weather conditions.

(2) See paragraph 2203, for a detailed discussion of the MATCS.

b. Marine Wing Weapons Unit, Marine Wing Support Group (MWSG)

(1) The MWWU must be attached to a group or squadron for administrative and logistic support.

(2) The mission of the MWWU is to provide support for the Marine aircraft wing in accordance with the missions and tasks promulgated in MCO 5440.2(_).

Section II. MARINE AIR COMMAND AND CONTROL SYSTEMS (MACCS)

2201. GENERAL

The ranges, speeds, and types of aircraft employed in support of an amphibious operation require that their control be directed from a high command level. The control of aircraft is more detailed and covers a much greater geographical area than other types of military control. Time and space factors preclude subdividing an extensive area into small zones of action as in the case of ground operations. High-speed aircraft cross a regimental or battalion zone of action in a matter of seconds. Because the speed and distances involved in dealing with aircraft are substantial and the necessity for immediate inflight response to directives and orders in air operations, it is paramount that the controlling commander communicate directly with individual aircraft flights through a centralized control system. For example, a situation may develop in which aircraft airborne on a prebriefed attack mission must be diverted to engage a newly discovered target threatening the landing force. Time would not permit the requisite change in orders to be transmitted through a group commander even though the aircraft are organic to the group. It is in response to this timesaving need that coordination and control of air operations over a relatively broad area by a single commander is essential. This commander uses a system through which his authority is diffused and which acts for him in the actual control of aircraft. As is implied in the foregoing, all aircraft operating in the objective area are not controlled from a single location. The air control system has subagencies, all of which exercise this detailed control of aircraft. The Marine air command and control system, as the total system is called, permits centralized coordination and supervision of air operations at the highest level, while incorporating decentralization of control authority to subordinate agencies. See figure 2 for the air command and control agencies and parent units found in the MACG. Figure 3 is an example of the MACCS deployed.

2202. CONTROL OF AIRCRAFT AND MISSILES

a. Control.--This aspect of Marine aviation is crucial since it integrates all aircraft activity into a single, coordinated system. It provides for the exercise of authority over, and direction of, air support elements during the conduct of operations. Through the MACCS, control is exercised to perform the following for all aviation functions:

(1) Airspace and air traffic control.

(2) Employment of aviation assets and weapon systems.

(3) Selection, coordination, and integration of the agencies of the MACCS for the execution of all Marine aviation functions.

b. Control of Offensive Air Support.--FMFM 5-1, Marine Aviation, contains a complete discussion of the aspects of control as applied to all aviation functions. This paragraph will restate pertinent aspects for offensive air support. Definitions are found in chapter 1, section II. Control of offensive air support varies depending upon the category: close air support or deep air support. As defined, the detailed integration requirements associated with close air support make its control more intricate than deep air support.

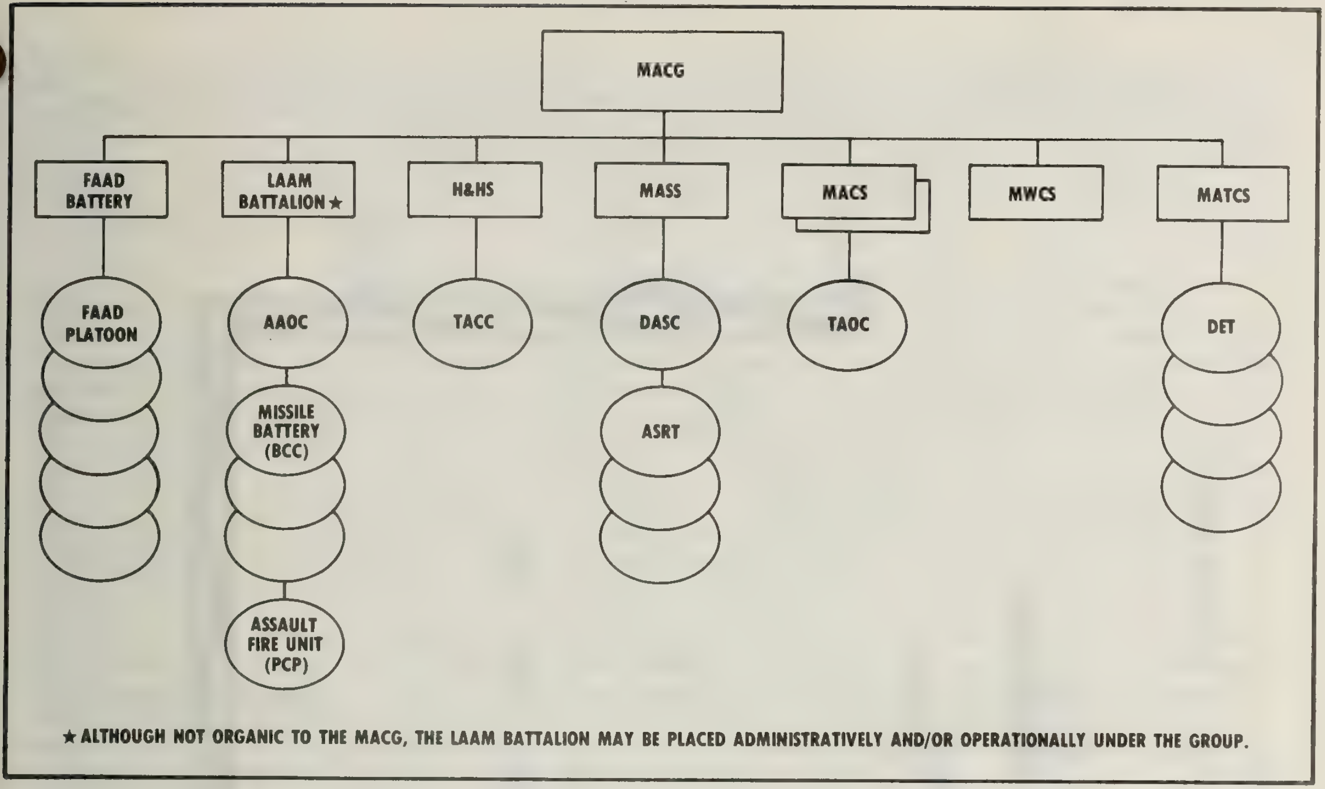


Figure 2.--Marine Air Control Group.

(1) Air Direction.--Air direction tasks for both preplanned close air support and deep air support are similar. Preplanned close air support and deep air support require air direction only in the sense that launch times, proper terminal control assignments, bomb damage assessment reports, and aircraft recoveries are monitored. For immediate close air support, however, air direction requirements are more detailed; e.g., assets must be identified and schedules must be adjusted. The major differences between preplanned close air support and deep air support are time-sensitive factors and the extent of fire support coordination required. In close air support, the response times from both the MACCS and the aircraft themselves are short and the area covered by fixed-wing attack aircraft en route to and while on-target at low altitudes is large. Both have a considerable impact upon surface fires.

(2) Air Control

(a) Close Air Support.--Air control of close air support is a complicated task. Air control of preplanned and immediate close air support is similar, since ordnance delivery is a terminal control agency function and varies only when aircraft have arrived on station. En route, flight following is normally accomplished. Rendezvous and assumption of control by a terminal controller follows.

1 The MACCS terminal controller may be a forward air controller from the tactical air control party, an airborne foward air controller, or a naval aviation observer. Airborne controllers (AFAC's or NAO's) are preferred for close air support control as they are better able

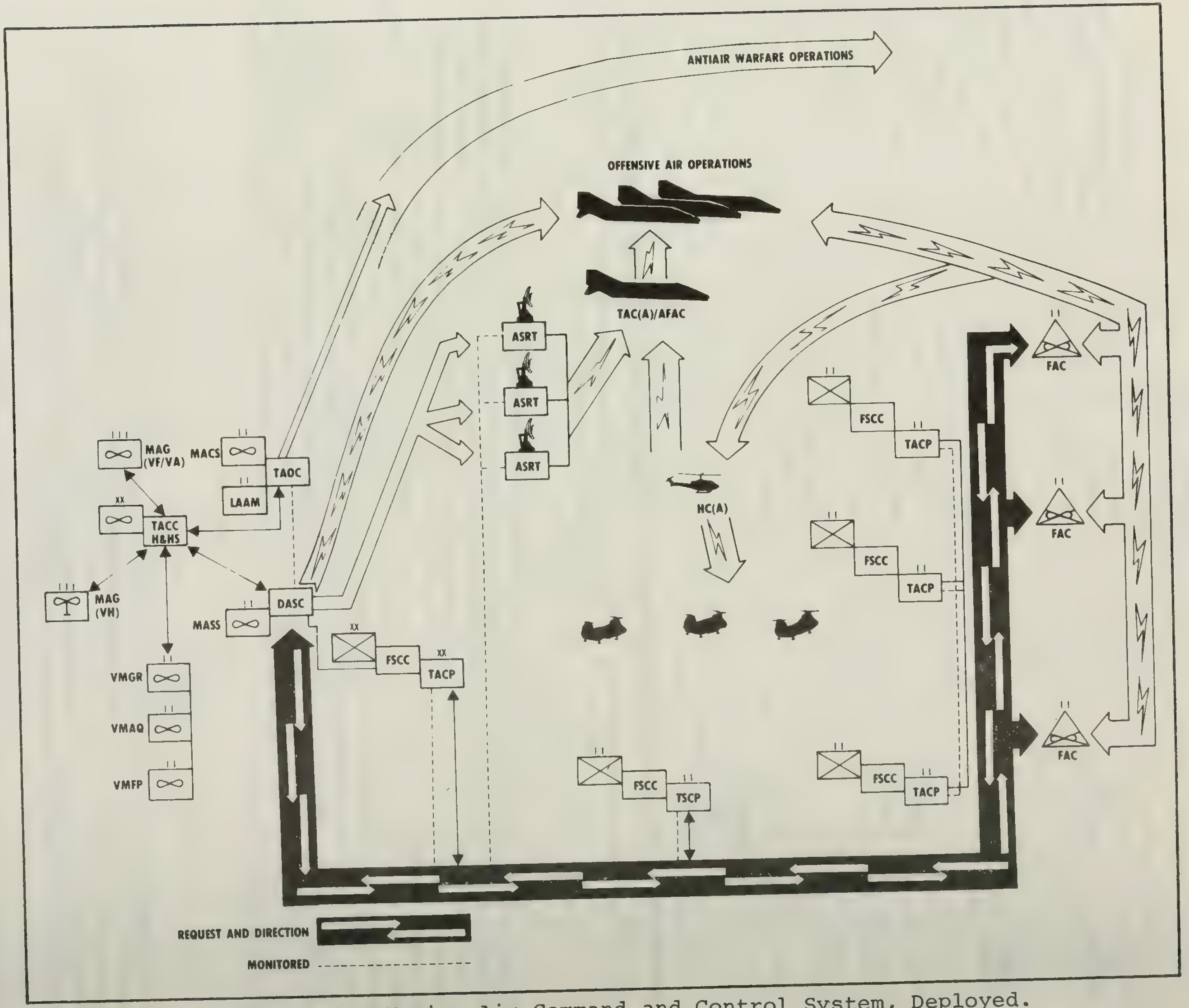


Figure 3.--Marine Air Command and Control System, Deployed.

to identify friendly troop positions from an airborne vantage point. However, in a high threat environment, the vulnerability of airborne controllers to enemy surface-to-air weapons may be so great as to preclude their use. In that case, the FAC will be used and delivery techniques designed to increase the survivability of delivery aircraft will be incorporated. In either event, a critical requirement for close air support is the identification of friendly positions prior to delivery.

2 Electronic aids may be utilized to effect terminal control. One method is a radar course direction facility/agency which, through precision radar control, allows for ordnance delivery in reduced visibility conditions and from altitudes normally considered safe from man-packed surface-to-air weapons. A second method utilizes TACP operated ground-to-air beacons, employed in concert with appropriately configured aircraft, to determine both friendly and target locations.

3 Whatever methods of terminal control are used, fire support coordination remains the responsibility of the fire support coordinator (FSC). This coordination is best accomplished prior to the arrival on station of the close air support aircraft.

(b) Deep Air Support.--Because deep air support is conducted at ranges not requiring detailed integration with ground units and surface fire support units, control consists mainly of flight following to a hand-over point. This hand-over is to either terminal control by an airborne controller (AFAC or leader), or transfer of control to another agency for missions in support of forces external to the MAGTF.

2203. CONTROL AGENCIES

a. Tactical Air Command Center (TACC).--The TACC is the senior MACCS agency. The supervision, coordination, and general control of all tactical air operations in the MAGTF area of responsibility are conducted by the TACC. It also provides the Marine tactical air commander (TAC) with the means to direct and coordinate organic aviation with other services. The TACC exercises command and control of the entire MACCS through agencies both organic and nonorganic to the MACG. These agencies include the DASC and ASRT's of MASS, one or more TAOC's from the MACS's, the TACP's of the Marine division, and the MATCS's to effectively fulfill its responsibility for air direction and command of tactical air operations, current intelligence information regarding pertinent aspects of the air and ground situation is collected by the TACC. General situation information is displayed to enable the TAC or his designated representative to rapidly analyze and manage aviation assets. Control of the airspace is exercised through the TAOC's. Control of offensive air support is exercised through the DASC. This includes the authority to order the launch of reserve aircraft for priority missions. The TACC is equipped with the communication links necessary to gather and disseminate the information necessary for rapid shifts of aviation assets as the air situation requires. The role, tasks, and duties of the TACC are as follows:

(1) Role.--The role of the TACC is to function as the senior MAGTF air command and control agency and to establish the operational command post of the Marine air command and control system from which the TAC can supervise, direct, control, and coordinate all MAGTF tactical air operations.

(2) Tasks

(a) To maintain complete information on the air situation, including that ground combat information essential to the air effort.

(b) To manage all aircraft in the objective area to ensure the most balanced and properly weighed utilization of assets for tactical air operations.

(c) To oversee the operations of subordinate MACCS agencies to preserve economy and unity of effort in the execution of the TAC's air plans.

(d) To serve as the operational point of contact between the MACCS and external air control systems.

(e) To prescribe emission control (EMCON) conditions in the objective area.

(f) To prescribe succession of command and control responsibilities within the MACCS to compensate for any serious degradation within a component agency.

(3) Duties

(a) Coordinating the utilization of aircraft by the DASC.

(b) Diverting aircraft from scheduled missions to meet other priorities.

(c) Briefing pilots of diverted aircraft, as required.

(d) Establishing alert conditions for ground alert aircraft.

(e) Providing subordinate control agencies with appropriate flight schedules, identification signals, aircraft call signs, alert conditions, and aircraft availability.

(f) Maintaining current status displays of all friendly air operations and detected threats.

(g) Providing the focal point for the dissemination of tactical data information between air control agencies, both internal and external to the MACCS.

b. Tactical Air Direction Center (TADC).--The TADC is an air operations facility subordinate to a TACC (USN/USAF/USMC). The TADC acts to coordinate and direct all air operations in a specified portion of the objective area. The TADC is normally identical in organization, facilities, and capabilities to a TACC. A TAOC can also function as a TADC for limited periods. The essential difference between a TACC and the TADC is the amount of airspace for which each is responsible and the scope of their assigned tasks. When the MAGTF commander has overall responsibility for control of air in the objective area, he establishes a TACC. If, however, overall responsibility rests external to the MAGTF, the commander establishes a TADC for his sector of responsibility. When it becomes necessary to organize an amphibious task force into subordinate task groups, each task group may employ a TADC (afloat) for control of air operations in its sector of responsibility. Overall control is retained by the commander amphibious task force (CATF) through the task force TACC. The MACCS TADC may be viewed as a similar "task group" agency ashore with responsibility for air operations in the landward sector. When the commander landing force is capable of assuming control and when approved by the CATF, all control of air operations (in the objective area) passes ashore. The primary control agency, previously designated a TADC, becomes the TACC. The CATF's TACC reverts to the status of a TADC (afloat).

c. Tactical Air Operations Center (TAOC)

(1) General.--The TAOC is the subordinate operational element of a Marine air command and control system designed for control of a sector, en route air traffic, and air defense operations. The TAOC is placed under the control of a TACC/TADC ashore or afloat, depending upon the specific phase of a particular operation. Because of its surveillance radar capabilities, it is the primary source of radar control for all aircraft in its sector of responsibility. The TAOC detects, acquires, and tracks targets in its assigned area of responsibility and provides an up-to-date display of the air situation. Tactical data is exchanged by means of digital and/or voice communications with adjacent TAOC's, the TACC/TADC, and other agencies.

(2) Role.--The offensive air support role of the TAOC is to provide navigational assistance to friendly aircraft in the accomplishment of support missions. Additionally, the TAOC functions as the alternate TACC/TADC when directed.

(3) Tasks

(a) Recommending geographic sectors/subsectors of responsibility for itself and component elements.

(b) Detecting, identifying, and classifying all aircraft within its sector of responsibility.

(c) Maintaining a summary display of the air situation within its capabilities and disseminating appropriate elements of this information to other designated agencies.

(d) Coordinating and executing emission control conditions as set by higher headquarters.

(e) Operating as a TACC/TADC for limited periods.

d. Direct Air Support Center

(1) General.--The DASC is the principal air control agency responsible for the conduct of tactical operations directly supporting ground forces. It functions in a decentralized mode of operations, but is directly supervised by the TACC/TADC. It is normally the first major air control agency ashore and normally lands in the same category as the senior ground combat element fire support coordination center (FSCC); e.g., scheduled or on-call waves. The DASC coordinates close air support strikes, assault support, and certain air reconnaissance missions. It also disseminates friendly and enemy aircraft information to the forward area air defense

(FAAD) battery to ensure effective employment of the Redeye missile system and coordinates the timely distribution of air assets assigned by the TACC (afloat) and helicopter direction center for allocation to appropriate terminal control agencies. These terminal control agencies include the FAC, the TAC(A), the helicopter coordinator (airborne) (HC(A)), and the ASRT's. The DASC collocates with the senior ground combat element FSCC and works closely with this agency to ensure the coordination with other supporting arms. Because of the necessity for detailed and continuous communications and coordination between the DASC and the FSCC, these agencies, where possible, should be collocated. In any case, when displacing either ashore or elsewhere, key DASC personnel should accompany personnel of the ground element to advise and assist in site selection. The DASC, equipped and operated by the MASS, may displace by echelon to preserve operational continuity. In addition to controlling and coordinating direct air support aircraft employment, the DASC receives ground and air intelligence information and disseminates this information to the TACC/TADC, TAOC, and FSCC. The DASC also coordinates the movement and identification of friendly aircraft and responds to the TAOC's requirement for position information of aircraft under its control.

(2) Role.--The role of the DASC is to provide the means for processing direct air support requests, to coordinate aircraft employment with other supporting arms, and to control assigned aircraft within the procedures of area airspace control.

(3) DASC Configurations.--FMFM 5-1, Marine Aviation, contains a complete discussion of DASC configurations and situations appropriate for their use.

(4) Tasks

(a) Receives fragmentary operation orders and coordinates scheduled preplanned close air support.

(b) Receives, processes, and coordinates ground force requests for immediate or on-call air support.

(c) Adjusts preplanned schedules and diverts airborne assets in accordance with the priorities of the continuing ground combat situation and degree of decentralized authority assigned by the TACC/TADC.

(d) Coordinates the execution of offensive air support missions with the activity of other fire support means through the appropriate FSCC to ensure maximum aircraft safety and minimum mutual interference.

(e) Refers all conflicts in supporting arms activity to the appropriate FSCC for resolution consistent with the mission of supported units.

(f) Provides an operational point of contact for both user agencies and close air support aircraft for the resolution of conflicting priorities and the coordination of efforts.

(g) Serves as the ground combat element's operational point of contact to ensure close air support response to changing ground tactical situations and a possible reevaluation of priorities.

(h) Receives and disseminates to the ground element's air representative all pertinent tactical intelligence and information reported by aircraft performing close air support air missions.

(i) Assigns control of DASC aircraft to subordinate terminal control agencies such as TACP's, TAC(A)'s, AFAC's, NAO's, ASRT's, and landing zone coordination points (LZCP's).

(j) Provides requesting aircraft and other air control agencies with appropriate advisory information for the conduct of safe flight. Such information includes airstrikes, TPQ drops, enemy antiaircraft activity, and airspace coordination areas.

(k) Assigns general routes of aircraft approach and retirement.

(l) Records, monitors, and displays information on the planned and existing state of offensive air support missions and advises TACC, TADC, and FSCC as required.

e. Air Support Radar Team

(1) General.--The ASRT is a terminal air support control agency subordinate to the DASC which provides precision control during all weather conditions. The ASRT employes a radar course directing central (RCDC) which consists of a precision radar and associated computer equipment designed to accurately position aircraft without visual reference to the earth's surface. Aircraft are guided to a point in space from which released bombs impact on a predetermined target. This is accomplished by using radar derived positional information and manually inserted target position information, wind data, ballistics data based upon the type ordnance being used, ordnance ejection velocity, speed, and altitude of the aircraft. In order to accurately compute this radar positional information, the RCDC must be established by an accurate land survey. There are three ASRT's organic to the MASS of the MACG. They are organized as highly mobile air control facilities and operate in support of the MAGTF.

(2) Role.--The role of the ASRT is to provide day/night all-weather precision control of aircraft operating in support of MAGTF operations.

(3) Tasks.--The principal task of the ASRT is to provide precision control of strike aircraft for medium and high altitude level bombing in support of the MAGTF. The ASRT also performs the following:

(a) Receives and computes target data for bombing missions.

(b) Briefs aircrews on the mission requirements.

(c) Coordinates with the TAOC or other appropriate control agencies to receive radar hand-overs of mission aircraft.

(d) Keeps the DASC fully advised as to ASRT operational status and conduct of operations.

(e) Notifies the DASC of the results of each mission.

(f) Positions aircraft at a geographic position which assists or permits the aircraft to accomplish a designated mission. An example is the positioning of aircraft for loft bombing or to a pushover point for air-to-surface missile delivery.

f. Marine Air Traffic Control Agencies.--Within the MACCS, expeditionary terminal air traffic control facilities are required for aircraft takeoffs and landings. The MATCS is an operational facility designed to handle the type and amount of air traffic found within an MAG. Prior to the entry of the MAGTF into the amphibious objective area, the area airspace control authority, in concert with indigenous national agencies if appropriate, will assign control areas and airspace control area procedures for air traffic control. Once ashore, the MATCS will commence operations in accordance with these general relationships, but operating primarily according to the policies of the TAC. In this situation, the MATCS joins with other MACS to provide continuous control of aircraft from launch to recovery.

(1) Role.--In order to provide the required functions for terminal and limited en route control, the MATCS is organized into three operational sections: approach control, ground-controlled approach (GCA), and control tower.

(2) Tasks.--The following general tasks are performed by MATCS during expeditionary operations:

(a) Provides for the safe, orderly, and expeditious flow of air traffic arriving within, and departing, the designated control area or control zone under all-weather conditions.

(b) Provides flight identification information on transiting or incoming friendly aircraft.

(c) Controls the expeditious launch of assigned ground alert aircraft.

(d) Identifies, reports, and assists inflight emergencies.

(e) Acts as the control agency for initiating designated search and rescue operations.

(f) Operates precision radar control facilities to provide for the safe recovery of friendly aircraft during conditions of reduced visibility.

(g) Coordinates with the local TAOC to ensure continuity of radar control for aircraft departures and recoveries.

(h) Establishes arrival and departure routes, procedures, and the traffic holding points (fixes) within the control area.

(3) MATCS Agencies.--MATCS operational subsections perform the following tasks:

(a) Approach Control.--Approach control is the controlling authority within the MATCS for all flights within the control area during instrument flight rules (IFR) conditions. During visual flight rules (VFR) conditions, the control authority is mutually shared by the control tower and approach control. The following tasks are performed by approach control:

1 Receives and processes flight plans and aircraft from adjacent air traffic control facilities.

2 Receives and handles aircraft recovery and departure.

3 Forwards necessary flight plan data to the TACC/TAOC.

4 Provides flight assistance as requested to include weather advisories, status of navigational aids, radar availability, and emergency assistance.

(b) Local Control.--The control tower is responsible for issuing information and clearances to aircraft operating in the control zone during VFR conditions in the airfield movement area. The control tower function is formally described as local control. Local control executes the following tasks:

1 Provides aircraft in the airport traffic area with information concerning airfield weather conditions, air traffic, active runway, altimeter setting, and other special information to ensure safety-of-flight.

2 Maintains adequate flight separation between departures and arrivals.

3 Receives information on IFR arrivals from approach control and relays proposed IFR departure flight plans to approach control. Once approved, it relays the approval/modification to the departing aircrew.

4 Ensures compliance with procedures governing traffic in the airport traffic area through visual surveillance.

(c) Ground Control Approach.--The GCA section is responsible for the effective radar control of aircraft that have been assigned by approach control or local control. This control normally covers the transition from an altitude assigned by approach control to termination by landing. In so doing, they perform the following tasks:

1 Provides precision radar control to aircraft landing under conditions of low ceiling and/or low visibility.

2 Provides air surveillance radar (azimuth and slant range only) letdowns to aircraft when appropriate.

3 Coordinates with the TAOC for ground controlled intercept (GCI)/GCA hand-overs.

4 Provides the TAOC aircraft position information when requested and when surveillance radar of approach control is inoperative.

g. Tactical Air Control Parties

(1) General.--The TACP is "a subordinate operational component of a tactical air control system designed to provide air liaison to land

forces and for the control of aircraft." TACP's establish and maintain facilities for liaison and communications between supported units and appropriate control agencies, inform and advise the ground unit commander on the employment of supporting aircraft, and request and control air support missions. There are two types of tactical air control parties. The first type is organic to the infantry battalion, and the second type is organic to the infantry regiments and division. The principal difference between the two types of TACP's is that the battalion TACP has two forward air control parties, while the regimental and division TACP's have none.

(2) Tasks

(a) Provide liaison and communications between the commander of the ground unit to which assigned and the appropriate air control agency.

(b) Provide the commander of the ground unit current information on the employment and availability of aircraft assigned to the support of his unit.

(c) Advise the ground unit commander and staff on matters concerning close air support.

(d) Prepare and forward requests for close air support in accordance with instructions received from the unit to which attached.

(e) Relay pertinent information to the tactical air control agency.

(f) Exercise control of aircraft during the terminal phase of close air support missions to ensure accuracy of weapons delivery and minimize danger to friendly troops.

(3) Division TACP.--The division TACP consists of 2 air control officers and 11 enlisted communication personnel. The senior air control officer normally performs the duties of the commander of the air and naval gunfire platoon, communication company, of the headquarters battalion. The air control officers assist the division air officer by monitoring all immediate air support requests from subordinate units, supervising the operation of aviation nets in the FSCC, and keeping the fire support coordinator advised of the general air situation and specific requests of subordinate units.

(4) Regimental TACP.--The regimental TACP is composed of one officer called the regimental air officer, assigned to the regimental operations section, and four enlisted communication personnel from the communication platoon of headquarters company. The air officer acts in a dual capacity as a special staff officer to the regimental commander in regard to all aviation matters and as the officer in charge of the regimental TACP. In the latter capacity, he may act as an air controller actually controlling an airstrike. He coordinates and consolidates all preplanned air support requests from subordinate units with the regimental FSC. He coordinates, as necessary, immediate air support requests from subordinate TACP's.

(5) Battalion TACP.--The battalion TACP's are composed of 3 officers and 12 enlisted communication personnel. The senior naval

aviator/naval flight officer functions as the battalion air officer and each of the other two officers is the leader of a FAC party.

(a) Air Officer.--The battalion air officer duties are similar to those of the regimental air officer. He normally remains with the battalion command group when deployed and functions as chief advisor to the battalion commander on all air operation matters. The battalion air officer supervises the training and operation of the two battalion FAC parties.

(b) Forward Air Control Parties.--The two FAC parties generally accompany the frontline companies of the battalion during all phases of the amphibious operation. The forward air controller controls aircraft executing missions in support of the battalion. The FAC maintains positive ground-air radio communications with assigned support aircraft from a forward position which permits him to observe and direct each aircraft in its run on the target. This control provides for accurate ordnance delivery and maximum troop safety. The primary duties of the FAC party are:

1 To operate well forward with the assault units of the battalion so as to observe and locate targets of opportunity.

2 To advise the supported company commander on the proper employment of air.

3 To direct airstrikes against targets, as requested.

4 To assess damage to those enemy targets after a close air support mission has been executed.

5 To gather and report all information of an intelligence nature.

6 To stay abreast of the supported unit's plans, position, and needs.

7 To stay abreast of the enemy situation, selection of targets, and location of friendly units.

(6) Division Air Section.--The division air section consists of four naval aviators/naval flight officers and is headed by a colonel. Although listed here, it is not a part of the division TACP. (Personnel from the division air section may augment the division TACP in the FSCC as necessary and the division air officer has staff cognizance over TACP operations.) The division air officer does, however, perform the following tasks normally performed by the TACP's:

(a) Provide the division commander current information on the employment and availability of aircraft assigned to the support of the division.

(b) Advise the division commander, his staff, and commanders of those elements not having TACP's, on matters concerning air support.

(c) Prepare and forward requests for preplanned close air support in accordance with instructions received from the division commander.

Section III. EQUIPMENT AND SYSTEMS

2301. GENERAL

Because of the multithreat environments encountered in military operations today, Marine Corps aircraft must be equipped with highly developed, sophisticated systems. The complex aircraft and related equipment used in offensive air support require highly skilled personnel both in the air and on the ground. The unique role of the Marine Corps as an amphibious force in readiness has created a need for correspondingly unique equipment and systems.

2302. AIRCRAFT

a. Fixed-Wing Attack

(1) AV-8.--This is a light attack, single-engine, jet aircraft. The AV-8 is designed for conventional ordnance delivery during daylight and visual flight conditions. It is capable of vertical takeoff and landing (VTOL) with a limited ordnance payload, and short takeoff and landing (STOL) operations at maximum gross weights. The AV-8 is suitable for operations aboard land or sea bases. Like a helicopter, it may operate from an LPD, LHA, LPH, or CVA. Because of its unique capacity to perform VTOL and STOL operations, it is extremely versatile and provides a considerable improvement in the close-in support and general attack abilities of the MAW. The AV-8 is operated by VMA squadrons. (See fig. 4.)

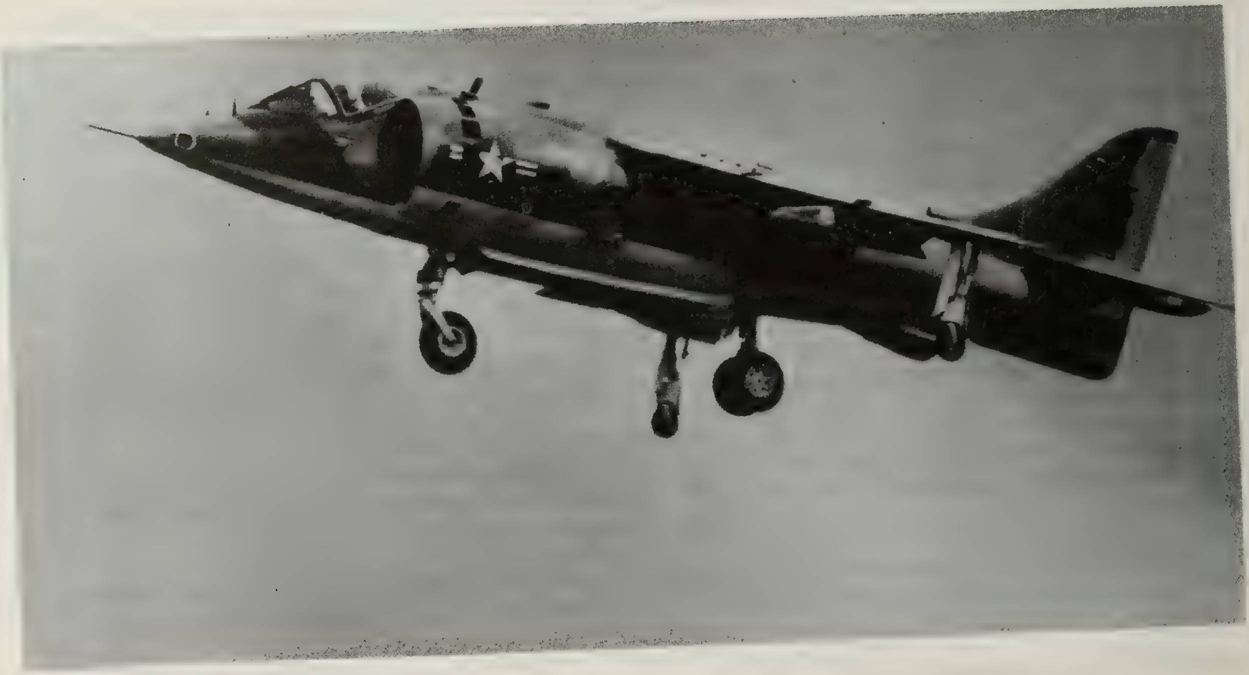


Figure 4.--AV-8.

(2) A-4.--The A-4 is a light attack, single-engine, jet aircraft. There are numerous models of the A-4 aircraft in service use. The A-4E/F/M and the TA-4F are currently employed by the Marine Corps, although the A-4E's and A-4F's are only employed in the Marine Corps reserve squadrons. All models of the A-4 have two internally mounted 20mm cannons. The A-4E/F and A-4M are single place, while the TA-4F is a two-place aircraft. The A-4M is the newest model in service with the Marine Corps. It has a vastly improved avionics package, (including VHF/FM radio). Redesigned weapons delivery control panel, more powerful engine, and a drag chute which allows it to operate from shorter airfields than earlier models. The A-4 is designed for the delivery of conventional and nuclear weapons during hours of daylight and under visual flight conditions; however, it also has the capability of delivering conventional ordnance, under the control of the TPQ-10 radar, using either manual or automatic release modes at night and during instrument weather conditions. Marine A-4 aircraft are used primarily for close air support, medium range interdiction missions, and helicopter escort during daylight and visual flight conditions. It is operated by VMA squadrons. (See fig. 5.)

(3) A-6.--The A-6 is a medium sized, two-engine, two-place, low altitude, all-weather attack aircraft. A central solid-state computer, search radar, doppler and inertial navigation systems provide an integrated attack-navigation capability which gives the aircraft the ability to locate, track, and attack moving targets and fixed targets in all-weather conditions. A forward air controller (FAC) equipped with a radar beacon (RABFAC) can transmit additional input to this on-board computer system. The bombardier/

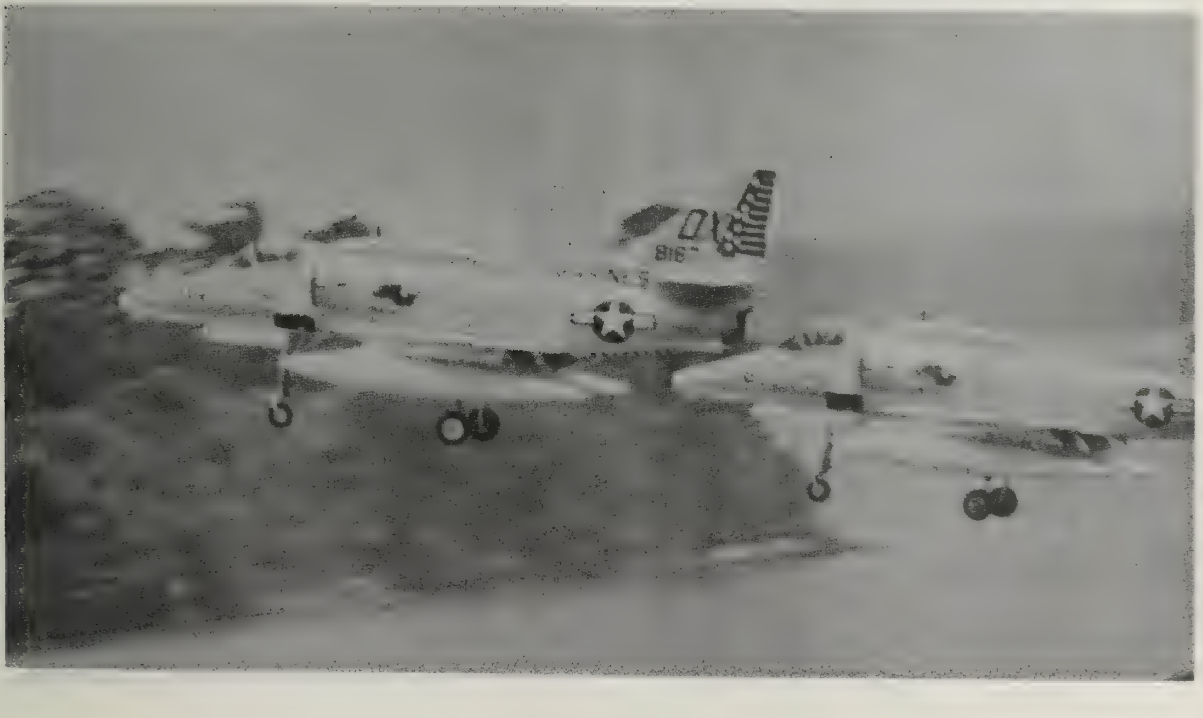


Figure 5.--A-4.

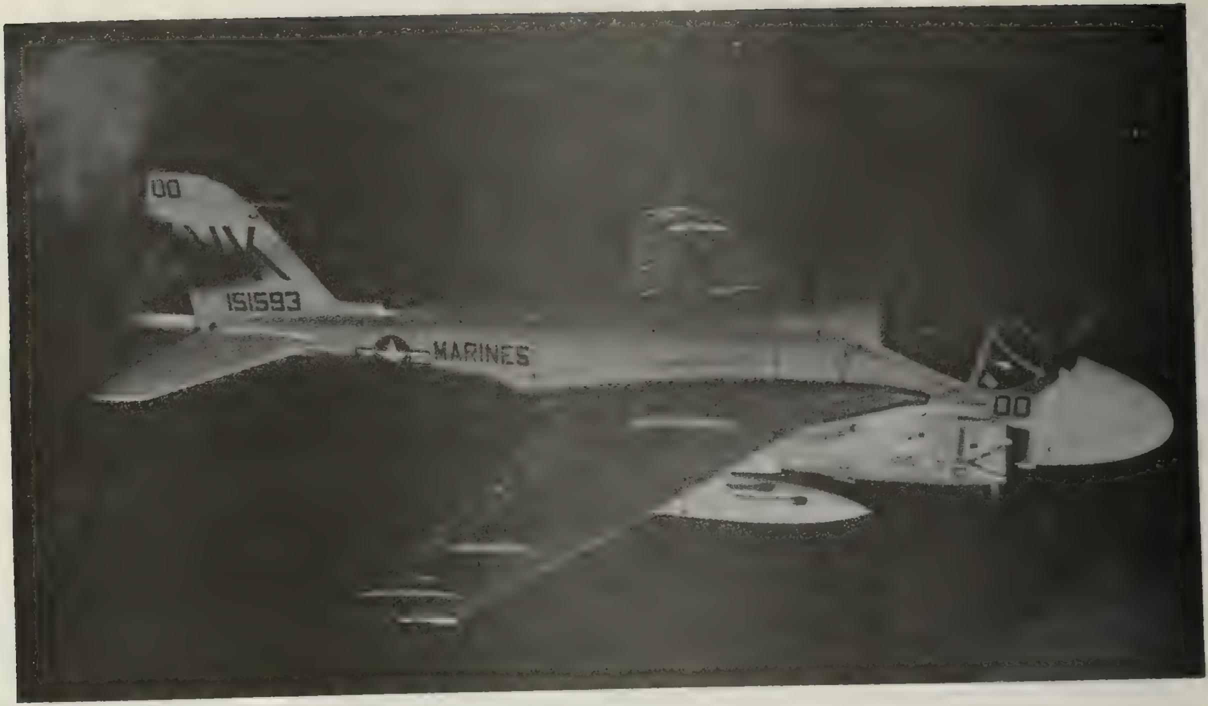


Figure 6.--A-6.

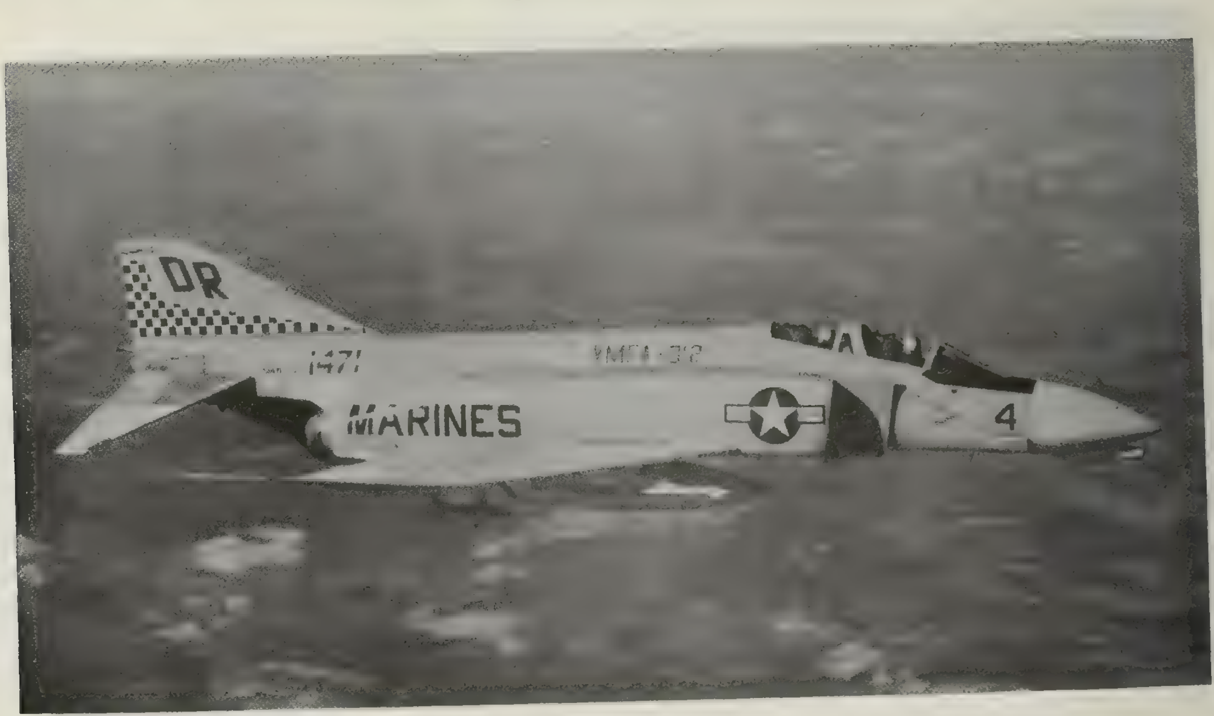


Figure 7.--F-4.

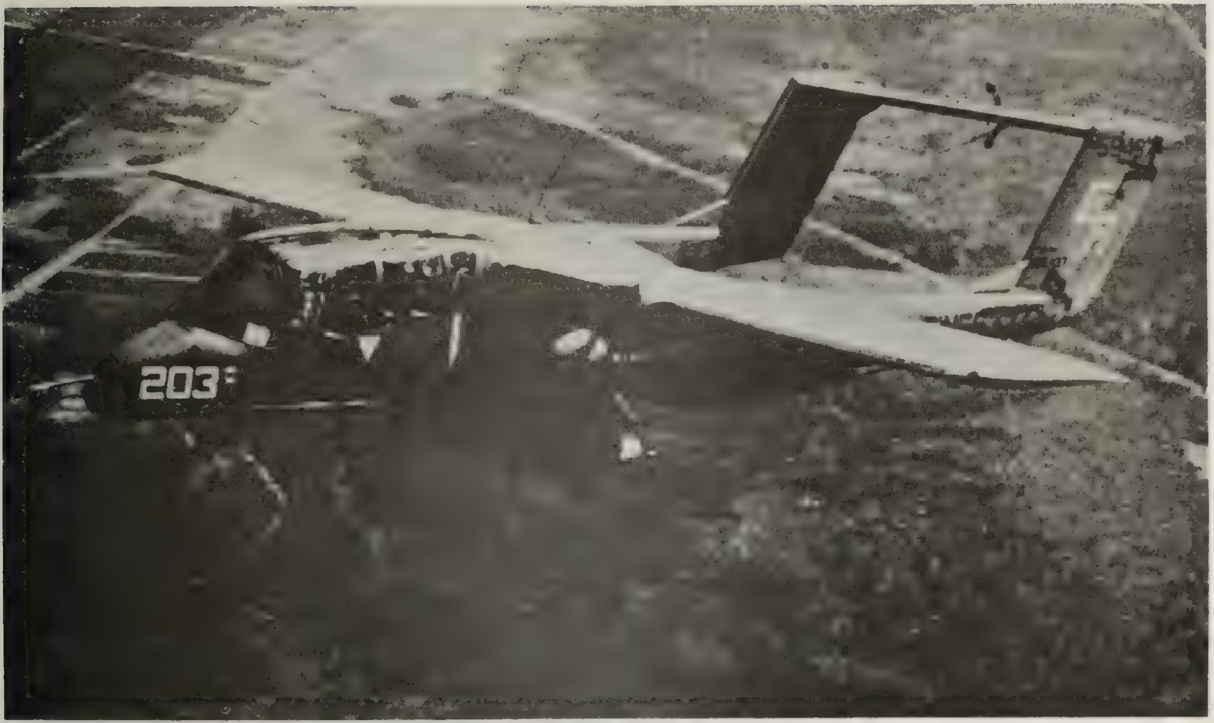


Figure 8.--OV-10.

navigator operates the system and provides pilot displays of contact analogue, terrain clearance, attack, and horizontal situation information in integrated form. It is operated by VMA(AW) squadrons. (See fig. 6.)

b. Fixed-Wing Fighter.--The F-4 is a supersonic, two-place, two-engine, all-weather fighter/attack aircraft. It has a retractable air refueling probe and a drag chute for reducing landing roll distances. The models currently employed by the Marine Corps are the F-4J and the F-4N. The F-4N is configured with the visual target acquisition system (VTAS) and sidewinder expanded acquisition mode (SEAM) which greatly enhances its air combat capability. The primary mission of the F-4 is the all-weather intercept of enemy aircraft. It has a secondary mission of attacking surface targets during daylight and visual flight conditions. F-4 aircraft are oprated by VMFA squadrons. (See fig. 7.)

c. Fixed-Wing Reconnaissance.--The OV-10 is a two-engine, two-place, short takeoff and landing aircraft. It is powered by two T-76 turboprop engines. Four 7.62mm guns are mounted in the ordnance sponson located under the main fuselage. The fuselage cargo compartment has a cargo bay accommodating six fully equipped combat troops. The primary mission of the OV-10 is visual observation and reconnaissance. It can serve as a vehicle for artillery or naval gunfire spotters and air controllers. The OV-10's armament allows it additionally to provide light suppressive fire for helicopter escort. The OV-10 is operated by VMO squadrons. (See fig. 8.)

2303. WEAPONS

a. General.--Marine aviation units are equipped with a variety of aircraft weapons and associated systems, and many of these weapons can be modified to suit the method of delivery and fusing necessary for each mission. In order to exploit fully the functional capacity of any weapon, it is essential to understand some basic nomenclature and what weapon options are available to the commander. Aviation weapons and systems include:

(1) General purpose and fire bombs.

(2) Rockets.

(3) Cluster bomb units (CBU's).

(4) Guns.

(5) Air-to-surface missiles.

(6) Air-to-air missiles.

(7) Flares.

(8) Special purpose weapons.

(NOTE: Only those weapons which reflect general capabilities are included. Complete weapons listings and descriptions and kill probability tables can be found in the FMFM 5-2 series, Joint Munitions Effectiveness Manuals (JMEM's).)

b. General Purpose, High Explosive Bombs.--The low-drag MK 80 series, general purpose bombs are the most frequently used by Marine aviation. (See figs. 9 and 10.) Specific weight classes and designations are as follows:

Designation	Weight Class
MK 81	250-pound
MK 82	500-pound
MK 83	1,000-pound
MK 84	2,000 pound

(1) Tail Assemblies.--The warheads of the MK 81, MK 82, and MK 83 may be configured with either of two types of tail assemblies--a

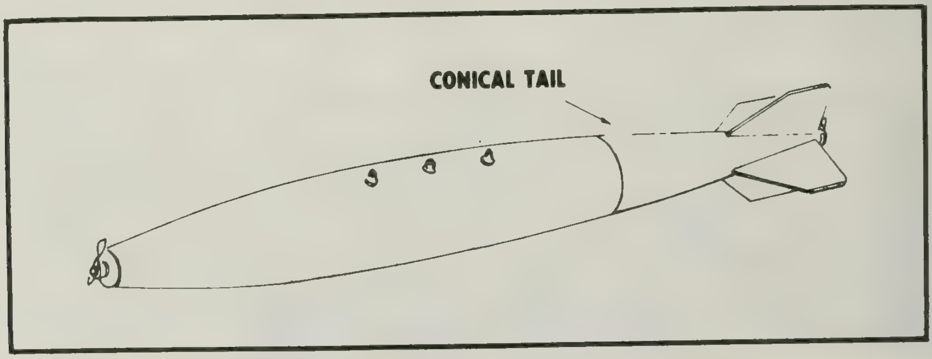


Figure 9.--General Purpose Bomb, Conical Tail.

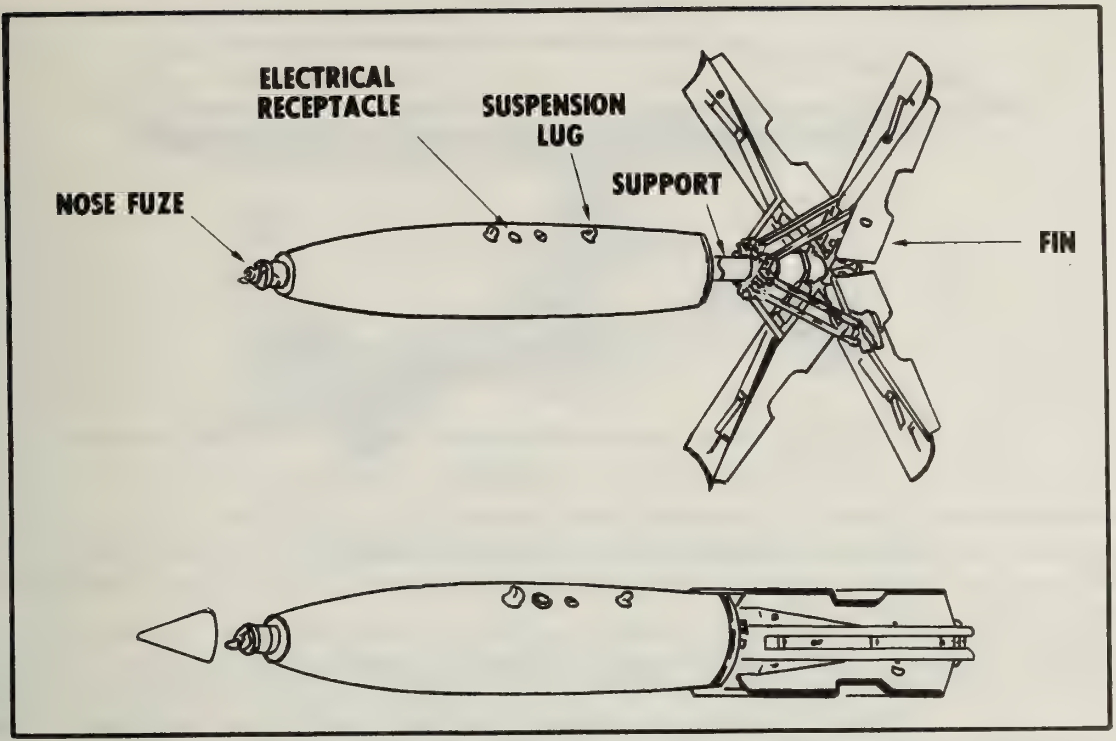


Figure 10.--General Purpose Bomb, Snakeye.

conical tail as shown in figure 9, or a retarding device as shown in figure 10. Bombs configured with the retarding tail device are called Snakeye bombs.

(2) Snakeye Bombs.--Snakeye bombs may be released in retarded mode (fin extended), or in a free-fall mode (fin retracted). The purpose of the retarded delivery is to allow bomb release from extremely low altitudes without endangering the delivering aircraft from ricochets, bomb fragments, or debris. The extended fins slow the bombs and allow the delivering aircraft time to separate from the projectile prior to its impact.

(3) Bomb Fusing.--Since weapon effectiveness is frequently determined by when and where the weapon detonates, proper fuze selection for the target to be attacked is critical. Fuze arming can be mechanical or electrical and can be positioned as nose, tail, or both. There are basically four types of bomb fuze detonations available:

(a) Proximity (airburst).

(b) Instantaneous (impact).

(c) Short delay (milliseconds).

(d) Long delay (hours).

c. Firebombs.--The MK 77 is the primary firebomb. (See fig. 11.) It has a fuel capacity of 75 gallons and weighs 520 pounds. Firebombs have a very erratic trajectory, and they must be released at very low altitudes

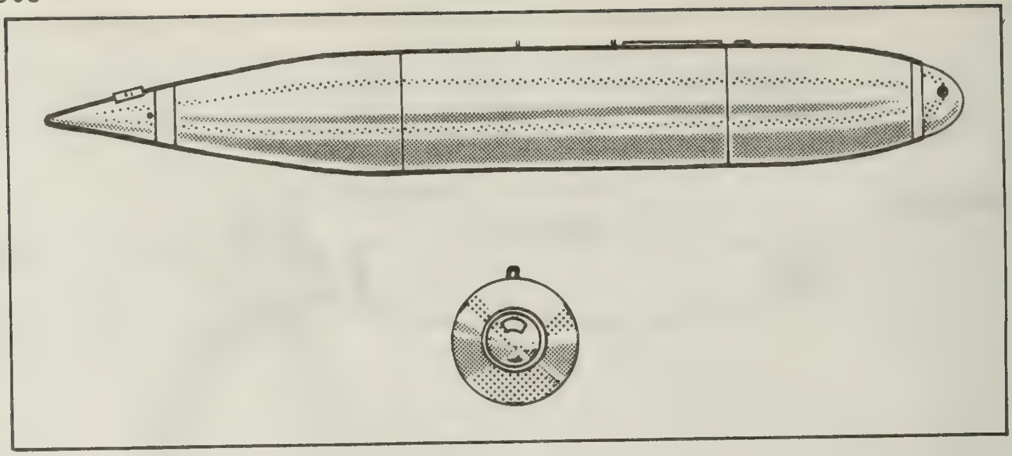


Figure 11.--MX 77 Firebomb (Napalm).

to achieve the desired accuracy. A typical ground pattern for the MK 77 is elliptical in shape and is approximately 215 feet long in the direction of delivery and 75 feet wide.

d. Cluster Bomb Unit Weapon Dispenser Systems

(1) The CBU weapon dispenser systems consist of several types of bomb casings filled with a large number of small weapons. There are a variety of different munitions including antipersonnel, antimaterial, and antitank. The CBU systems are designed to provide a high kill or damage probability against area, moving, and point targets. Although there are numerous dispenser-munition combinations, only the ones most frequently used will be discussed in this paragraph. For more technical information, see the FMFM 5-2 series, Joint Munitions Effectiveness Manuals.

(2) The Navy-developed MK 7 dispenser, loaded with MK 118 antitank bomblets, is designated as the MK 20 (Rockeye II) CBU weapon system. (See fig. 12.) The Rockeye is also compatible with carriage and delivery

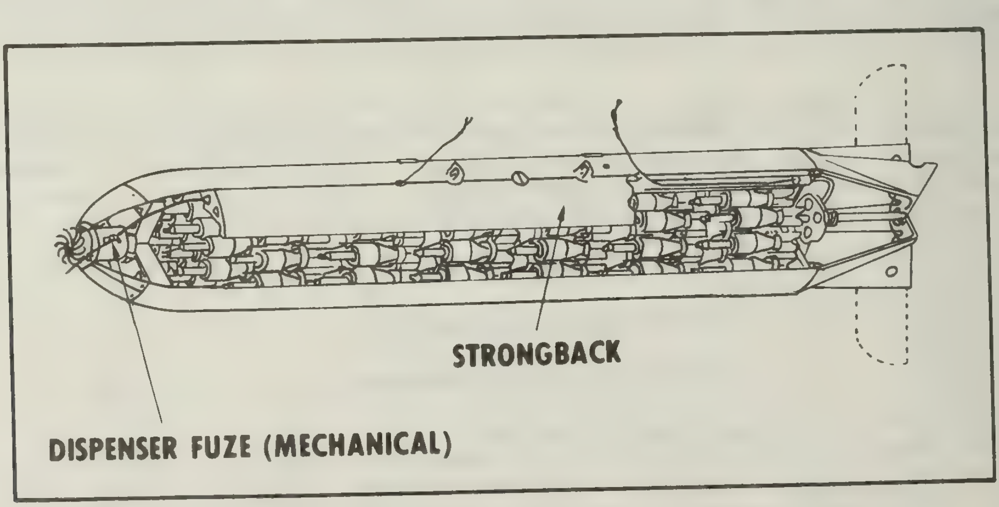


Figure 12.--Cluster Bomb Unit Weapon Dispenser, MK 20.

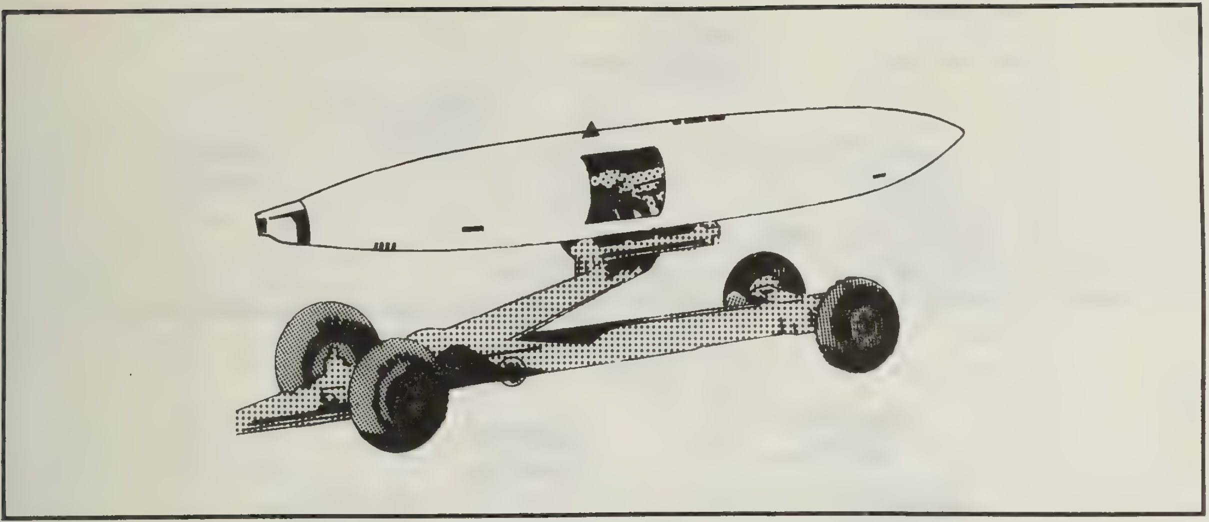


Figure 13.--MK 4, 20mm Gun Pod.

from MER/TER bomb racks and can be released from essentially all of the existing delivery maneuvers. In addition to being most effective against armor, the Rockeye has proven to be an excellent general purpose weapon.

e. Guns.--There are two basic gun configurations for the 20mm cannon--internal and external. The MK 4, 20mm gun pod is used in the external configuration. (See fig. 13.) It consists of two 20mm barrels; a rotating eight-chamber cylinder; and feed, firing, and ejector mechanisms. The pod has a 750-round capacity and a 4,800 ±200-round-per-minute rate of fire. The GPU-2/A, lightweight 20mm gun pod contains an M-197 gun, which has a 300-round capacity and low firing rate of 750-rounds per minute. (See fig. 14.) The GPU-2/A will be authorized to attack/helicopter MAG's. The 20mm gun is probably our most accurate and effective weapon against light and medium armored surface targets. Its greatest limitation is its lack of a standoff capability in heavily defended areas.

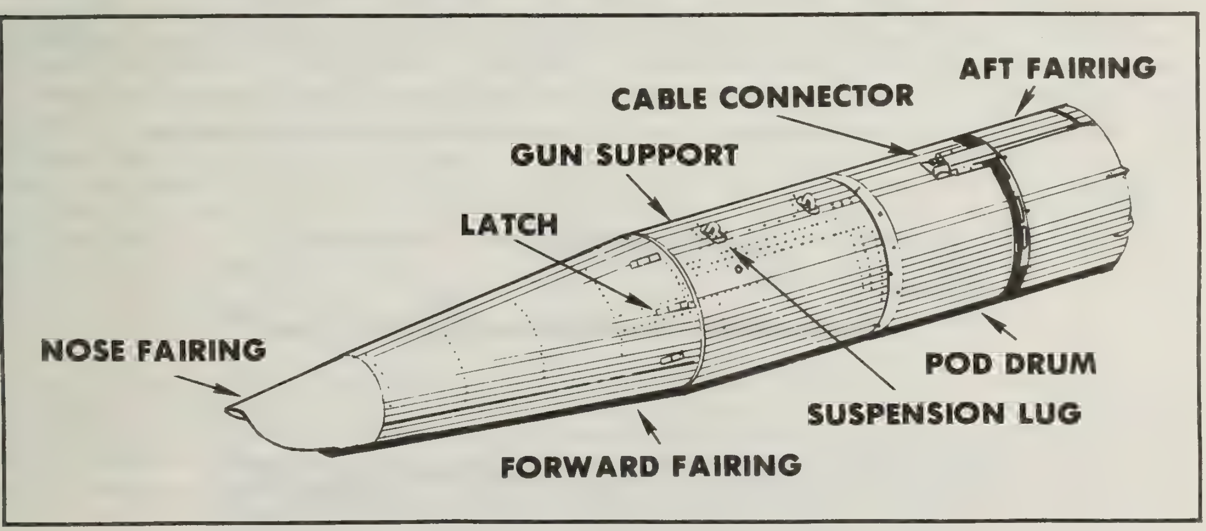


Figure 14.--GPU-2/A, Lightweight 20mm Gun Pod.

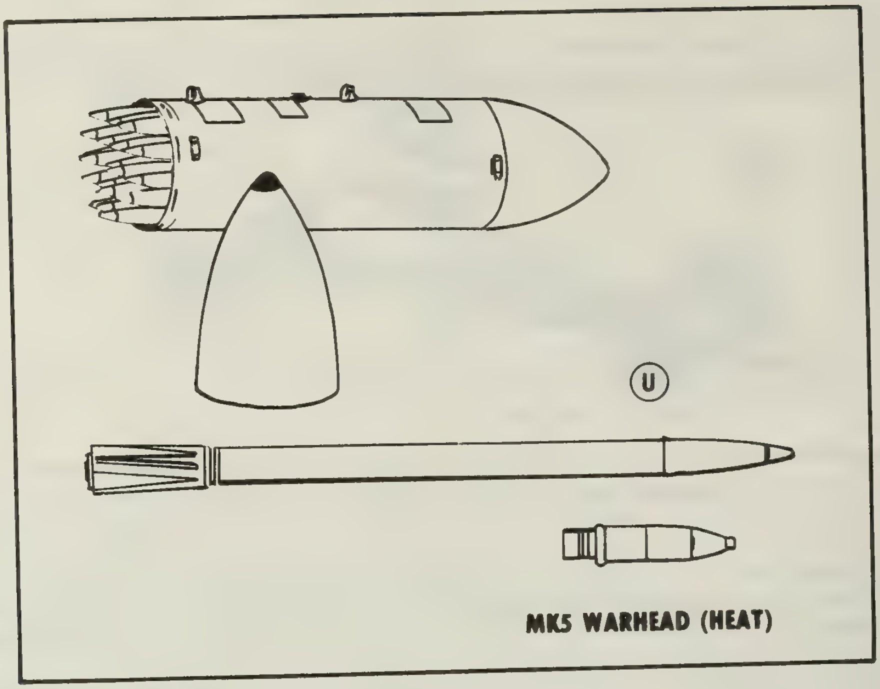


Figure 15.--2.75-Inch Folding Fin Aircraft Rocket.

f. Rockets.--Two types of air-to-surface rockets exist in the Marine Corps inventory--the 2.75-inch folding fin aircraft rocket (FFAR) and the 5-inch Zuni rocket.

(1) The 2.75-inch FFAR can be launched from two different pods; one pod carries 7 rockets and the other 19. (See fig. 15.) Presently, three types of warheads exist for this rocket--smoke for marking, fragmentation, and antitank or shaped charge. Rockets are usually fired in ripple (rapid repeat) in combat, since ripple firing greatly increases the probability of a hit.

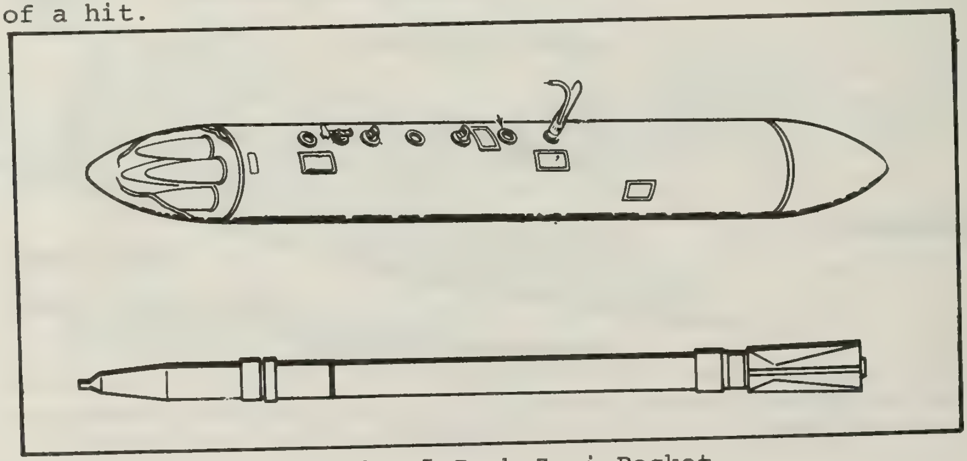


Figure 16.--5-Inch Zuni Rocket.

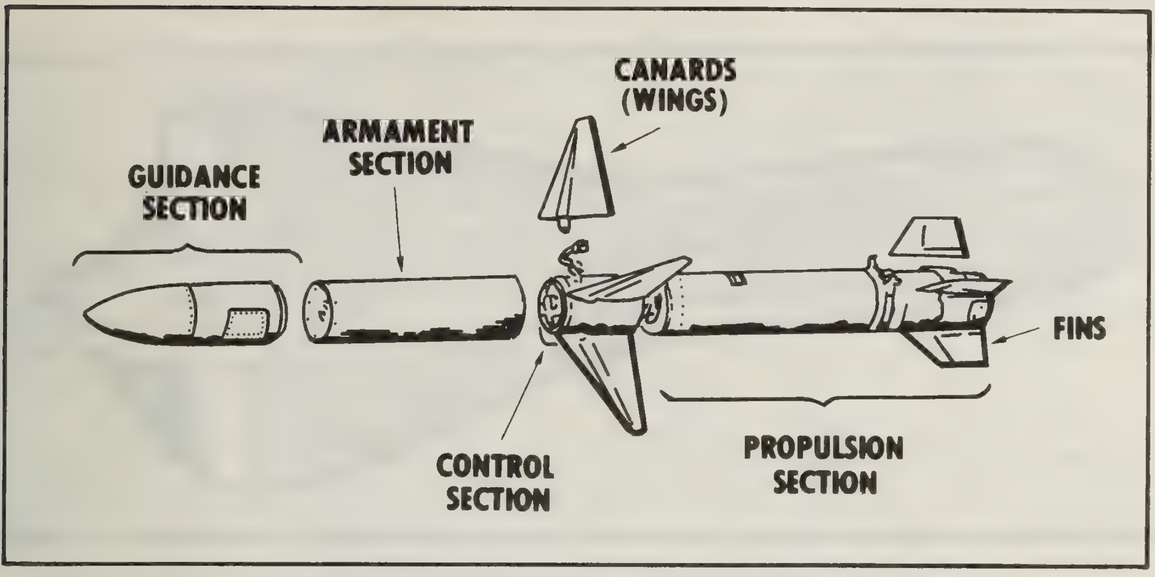


Figure 17.--Shrike Antiradar Missile.

(2) The 5-inch Zuni rocket is carried and launched from either a two-tube launcher or a four-tube rocket pod. (See fig. 16.) Rockets can be fired singly or in ripple; the warheads for the Zuni include fragmentation, antitank, shaped charge, and white phosphorous.

(3) The best ground fragmentation pattern is achieved by firing one pod or more on the same pass.

g. Air-to-Surface Guided Missiles.--The Bullpup, Shrike, and Walleye air-to-surface guided missiles have greatly increased our abilities in highly sophisticated defensive environments against hard or specialized targets. The design characteristics of these weapons provide increased accuracy, improved warhead effectiveness, and standoff capabilities.

(1) Shrike.--Shrike is a 400-pound, antiradar missile capable of detecting and homing on pulse-type radars. (See fig. 17.) Shrike's range is highly dependent upon the mode of delivery.

(2) Walleye.--Walleye is an air-to-ground glide bomb which has an automatic television-type guidance system. (See fig. 18.) The warhead is especially designed for use against heavily structured targets. In the close air support role, is is restricted to targets which are well defined, easy to acquire, and which contrast sufficiently with their surroundings for the homing of the weapon. It is also limited to daylight and clear weather conditions.

2304. CAPABILITIES OF AIRCRAFT WEAPONS SYSTEMS

The principal advantages of aircraft weapons accrue from their ability to hit targets which other supporting arms cannot engage because of range or defilade; to deliver munitions, including special weapons of great destructive power; and to destroy heavily fortified positions and point targets. Other significant aircraft capabilities include:

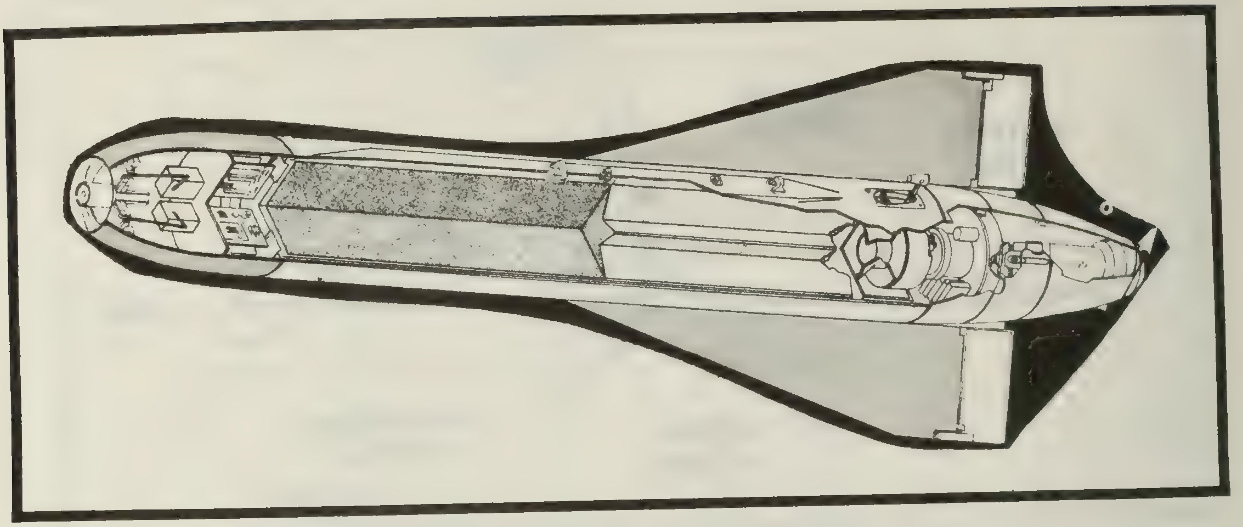


Figure 18.--Walleye Air-to-Ground Glide Bomb.

a. Variety of Attack.--Subject to weather, terrain, and troop safety limitations, aircraft have the ability to carry out the type of attack best suited to the target.

b. Accuracy.--The expected accuracy of air-to-surface weapons is dependent upon several factors, such as the degree of individual pilot proficiency and level of training, the visibility, and the pilot's ability to see the target or aim point. The expected accuracy is also affected by the type of delivery maneuver and the release height of the particular weapon. Normally, the delivery maneuvers used in a close air support situation would range from a level delivery to glide/dive angles up to 45 degrees. The release heights will vary from approximately 75 feet to 4,500 feet above the target elevation. Specific expected accuracies for the various weapons and delivery combinations can be found in the FMFM 5-2 series, Joint Munitions Effectiveness Manuals. Generally speaking, the normal order of expected accuracy for air delivered weapons is as follows:

(1) Strafing.

(2) Retarded Snakeye bombs and firebombs.

(3) Rockets.

(4) Free-fall (unretarded bombs).

c. Observation.--Aircraft performing close air support missions are capable of maintaining continuing observation over large areas, in addition to the area in which a close air support mission is being conducted. This capability enables aviation units to be of great assistance to the supported ground unit commander. Support aircraft can relay information of immediate value to the ground commander regarding enemy activity on reverse slopes and in other areas beyond or shielded from ground observation. The capability to search for and attack targets gives air support a significant advantage over other fire support means.

d. Speed and Maneuverability.--The speed of aircraft enables commanders to concentrate overwhelming air strength in the objective area from distant and dispersed bases and to deliver attacks with a great measure of surprise. Their speed and maneuverability also provide a measure of protection from enemy fires and detection from enemy radar.

e. Neutralization.--The ability of aircraft to operate in flights of more than one aircraft with great speed, and to carry large amounts and a variety of ordnance, enables them to neutralize targets that threaten landing force operations. Continued neutralization over a prolonged period is dependent upon the availability of aircraft; ordnance; petroleum, oil, and lubricants (POL); and integration with other supporting arms.

f. Radius of Action.--Tactical air support aircraft can operate from land bases or from aircraft carriers located a considerable distance from the target. The normal combat radius of support aircraft can be extended by in-flight refueling.

g. Mobility and Flexibility.--The mobility and flexibility of supporting air units permit the employment of a limited number of aircraft against individual targets or the concentration of large numbers of aircraft against targets of greater extent and more importance. The variety of armament which can be carried by each aircraft permits flexibility in selection of targets and makes every type of enemy installation a potential target. The control of close air support is highly flexible, since within the control system a close air support mission can be controlled by either ground agencies which include either a forward air controller or an air support radar team; or by airborne agencies, an airborne forward air controller or a naval aviation observer. Control can be shifted between these agencies as required to maximize effectiveness. The variety of delivery methods available from aircraft range from high angle; e.g., dive bombing, to low angle; e.g., glide bombing. The ability to integrate aircraft support with other supporting arms enhances their overall flexibility. The independence from terrain obstacles; e.g., rivers, hills, etc., and the aircraft's tremendous speed generally provide a mobility advantage to aircraft over surfaceborne supporting arms in the changing of areas or targets.

h. Availability.--Primary dependence is normally placed on tactical aviation in land operations beyond the range of naval gunfire and during periods when the artillery is displacing or is inferior to that of the enemy. During the assault phase of an amphibious operation and prior to landing the force's artillery, air and naval gunfire are the primary supporting arms available to the landing force. During the planning phase, aviation support is planned so as to provide the maximum number of aircraft possible in close support of the ground forces during the assault phase. Aircraft are maintained in an air alert status over designated points during the assault phase. This permits a part or all of an air unit to be directed against a critical target with minimum delay. V/STOL aircraft possess a forward based ground loiter capability that can match or better response times of air alert aircraft with significantly reduced draw-down of assets available. Ground alert aircraft enhance the overall capability of air to support landing force units; however, ground alert aircraft require a longer period of time to provide the support requested than aircraft in an air alert status.

i. Morale Effect.--Closely allied to all of the above is the positive effect air support has upon the morale of the supported troops. The airplane is an outstanding morale builder to friendly forces and, conversely, serves as a symbol of defeat to the enemy. The presence of aircraft engaged in close support missions has a detrimental effect on an enemy's morale, since it is a positive indication that the enemy has lost control of the air--that one arm of his forces has been overcome or defeated. Since the average enemy soldier cannot always determine the type of armament or aircraft, the aircraft alone can lower his morale and restrict his actions. When engaged in retrograde operations, maximum use of air support is essential to exploit the morale effect which it engenders in both the friendly and the enemy force.

2305. LIMITATIONS OF AIRCRAFT WEAPONS SYSTEMS

The most significant limitation of aircraft weapons systems is the difficulty in providing support at night and in periods of limited visibility. Other significant aircraft limitations include:

a. Radius of Action.--The radius of action of an aircraft is determined primarily by the fuel on board in relation to the amount of armament carried. As the ordnance load is increased, beyond a certain point there must be a compensatory reduction in the fuel that can be carried. This, in turn, reduced the distance that the aircraft can travel to and from the target.

b. Time on Station.--Time on station is also influenced by the factors set forth above. Other factors are distance from the air base to the forward edge of the battle area (FEBA), fuel consumption in relation to altitude flown, and fuel reserve requirements. Jet aircraft are least efficient in endurance when operating at low altitudes. Air alert aircraft, therefore, normally orbit at higher altitudes while awaiting a strike mission. Forward based V/STOL aircraft are capable of extended time on station while awaiting a strike mission when utilizing a ground loiter capability. Even though the V/STOL aircraft is not actually airborne, his effective "time on station" is increased. In a high threat missile environment, aircraft can be expected to remain in the target area no longer than 3-5 minutes.

c. Communications.--Radio communications are of great importance to air support strikes. Radio communications are the only means for transmitting detailed instructions to airborne aircraft. Coordination of aircraft support missions with airspace coordination areas (ACA's) and suppression of enemy air defenses (SEAD) requires positive control and reliable radio communications. Due to sophisticated enemy communications jamming systems/devices, lengthy conversations between aircraft and controlling agencies may be precluded. Mission briefs, coordination, etc. will, by necessity, be accomplished prior to launch. Target acquisition and identification will normally be accomplished by dead reckoning navigation and prebriefed markings.

d. Identification of Targets.--Identification and location of prebriefed targets are done visually, usually by reference to grid maps or aerial photographs, and by good target descriptions. The controller must communicate the description and location of the target to the pilot by radio. Target-marking devices are utilized where practicable and desirable. Training, improvements in target grid photos, and improved electronic equipment offer effective means for making target identification more rapidly and positively. Navigation aids may be used to bring aircraft into a target area. Further identification may be done in relation to prominent terrain features and the use of smoke.

e. Weather.--Weather, in addition to being a limiting factor itself, aggravates all other limitations. The weather at the target is the main limitation, rather than en route and home base weather. Weather at the target area makes location of the target difficult and limits the types of attack which can be made. With low ceiling and poor visibility, the effectiveness of visual close support decreases. As ceiling and visibility improve, so does the capability for close air support. Rapid progress is being made in the technology of close air support attack, as well as the identification of targets and launching of missiles against targets under all conditions of weather and darkness.

f. Enemy Antiaircraft Efforts.--The proliferation of man-packed and vehicle-mounted antiaircraft artillery and missile systems provides an opportunity to mass antiair fires with frontline units. Concentrations of fire by in-flight tracking weapons systems may force offensive air support aircraft into a defensive role and preclude the effective employment of weapons in support of ground troops.

2306. GROUND SUPPORT

An extensive support effort is required to keep aircraft flying. Since an aircraft is not performing its mission while awaiting servicing on the ground, minimum time should be spent on refueling, rearming, and general maintenance. In consonance with this overall effort, a vast array of equipment is required in the ground support role to expedite the necessities of making aircraft launch-ready.

a. Aircraft Ground Support

(1) Vehicles.--All sorts, sizes, and shapes are needed to start, tow, service, and recover aircraft. Types of vehicles range from a small battery cart to a gigantic crane. Examples of ground support vehicles are contained in the following list, but they are too numerous to cover in detail in this publication:

(a) Tow tractors; for towing and positioning aircraft.

(b) Starting units; to provide the electrical power and compressed air necessary for starting or performing maintenance functions.

(c) Oxygen/nitrogen carts; to service and replenish oxygen/nitrogen systems.

(d) Fuel trucks; for refueling if a tactical airfield fuel dispensing system (TAFDS) is not operating.

(e) Defueling trucks; for defueling as a safety measure prior to maintenance work or to withdraw contaminated fuel.

(f) Crash vehicles; to provide fire fighting and rescue equipment, and the personnel specifically trained to minimize injury and damage resulting from an aircraft mishap.

(g) Cranes; for lifting disabled aircraft and aircraft parts (e.g., engines, transmissions, or portions of a fuselage).

(2) Maintenance Equipment.--Ground support equipment not categorized as vehicles, but specifically designed for aircraft maintenance includes:

(a) Work platforms; can be raised or lowered to reach the area on the aircraft upon which maintenance must be performed. They provide a steady, level platform on which to work.

(b) Portable jacks; necessary to change tires or the landing gear.

(c) Engine stands; especially designed for ease in changing engines and to perform maintenance on the engine while it is out of the aircraft.

(d) Hydraulic jenny; portable hydraulic unit used for servicing the hydraulic system of an aircraft. It provides hydraulic pressure to the aircraft systems without turning up the aircraft engine; thus, hydraulic systems can be checked.

(3) Ordnance Support Equipment and Spaces

(a) Weapons loader; to ease the loading of ordnance aboard aircraft.

(b) Weapons carrier; carries ordnance from buildup area to aircraft.

(c) Buildup area; a designated area for the assembly of ordnance. It is normally located away from the aircraft and personnel.

(4) Avionics Ground Support

(a) Air conditioned mobile maintenance facilities (MMF's) provide controlled environment for maintenance of the sensitive avionics systems.

(b) Test equipment; usually maintained in the air conditioned trailers to test and repair avionics components.

b. Radar Ground Support.--A radar facility will usually be dispersed over a wide area, thereby necessitating a fairly large amount of space and equipment for its operation.

(1) Air Conditioned Soundproof Trailer.--Radar equipment generates a large amount of heat. To prolong the life of the equipment, air conditioning is necessary. Also, the critical radio communications between the controllers and aircraft require protection from environmental noise.

(2) Radar Units.--Radar units are usually large and consideration must be given to their location and the space required to accommodate them.

(3) Portable Equipment

(a) Radar beacon forward air controller radar beacon for air control used by a forward air controller to guide aircraft to a target during inclement weather.

(b) ASRT equipment; trailers, antennae, and vehicles to support an ASRT.

(4) Computers for TACC/TAOC.--These must be in an air conditioned space to prolong the life of the computers. They are used to disseminate information vital to the aircraft.

2307. AUTOMATED DATA SYSTEMS (ADS)

A basic understanding of computer systems is essential for commanders. Automated data systems provide timely, mission-essential information and may have a decisive influence on the outcome of future combat operations.

a. Responsibility of the Commander.--Most computers have five predominant characteristics. They are digital, electronic, high-speed devices providing automatic retrieval of information utilizing a stored program. A computer functions only in response to the way in which it has been programmed and is, therefore, only as accurate and efficient as the people who program and operate it. Any computer must be provided current and accurate data. It is the responsibility of the military commander to determine what information is to be analyzed, what the relative weights of the variables are, and in what format the resultant analysis is to be presented. The computer assists the commander in decision making by providing a source of accurate and responsive information, but to take advantage of this capability, he must ensure efficient operation at both ends of the system. Once again, to get sound and useful information from a computer, the information input must be accurate and the program selected applicable.

b. Types of Systems.--The Marine Corps uses three types of automated data systems. These systems may share computers and information as warranted. They are:

(1) Functional Systems.--Functional systems are those designed primarily to aid in the execution of administrative command and control of resources. In the processes of planning, acquiring, and distributing resources, historical information is developed on which decisions can be based.

(2) Tactical Systems.--Tactical systems are those systems designed to assist in the command and control of forces in a combat environment.

(a) TACC.--Within the TACC, the requirement exists to display selected information. This need is generated by the responsibility of the TACC to direct and supervise MAGTF air activity. The TACC is equipped with manual status boards for these displays which include information concerning equipment, communication status, weather reports, and other pertinent information. The tactical air communication central, AN/TYQ-1, and tactical data communication central, AN/TYQ-3, developed to replace the manual system under the Marine tactical data system (MTDS) program, provide the TACC with the automatic data processing display and communication equipment to effectively manage all air operations with a minimum delay in decision making.

(b) TAOC.--Component elements of the TAOC require different displays which correspond to the different tasks performed. Of major concern are the displays available to the weapons controller and the senior weapons director. These men are responsible for evaluations and commitments of weapons, and must rapidly be made aware of needs. The weapons controller has available a display of a subsector of his responsibility. Symbology on the display provides the identification designations of the various aircraft operating within and adjacent to the subsector. Symbology also represents the weapons aboard the aircraft and their readiness status to the controller.

(3) Information Systems.--An information system is designed and used primarily for the purpose of assisting the Commandant of the Marine Corps and subordinate commanders in the acquisition and management of resources. It draws from functional and tactical systems, as needed, to provide information for inquiring commands.

c. Amphibious Support Information System (ASIS).--ASIS stores information on personnel, intelligence, landing serials, air schedules, aircraft ordnance, target lists, supply management, material management, and ammunition status. It also performs tasks such as communication scrambling. As a system of such flexibility, it is of important use to the commander. The ASIS is located on LCC class vessels.

d. Ground Supply and Maintenance Automated Data Systems.--The ground supply and maintenance automated data systems are the Supported Activities Supply System (SASSY) and the Marine Corps Integrated Maintenance Management Systems (MIMMS). These systems provide information required to manage these two logistics functions for Marine Corps peculiar items of equipment.

e. Future Systems.--Future systems of importance to the aviation commander are being developed and/or tested to provide an automated air command and control system and a position-location reporting system. These systems will provide closer coordination with ground elements which will be particularly useful in fire support coordination.

f. Synopsis.--This paragraph does not mention all the systems. It does point up the fact that they all are limited by the availability of the user to provide input to the system. Moreover, the commander must understand what the computers are doing for him and what he must do to ensure that his command continues to function when and if the computer fails.

CHAPTER 3

AMPHIBIOUS OPERATIONS

Section I. INTRODUCTION

3101. GENERAL

The amphibious operation integrates ships, aircraft, weapons, and landing forces in a concerted military effort against a hostile shore. The amphibious assault builds up combat power ashore from an initial zero capability to a fully coordinated striking power in the face of the difficulties of seas, surf, and hydrographic features, in addition to the problems normally encountered in land warfare. Close cooperation and detailed coordination among all participating forces in an amphibious operation are essential to success. There must be a clear understanding of the mutual obligations and of the special capabilities and problems of each component. Because the assault elements are closely tied to the ground combat element, their logistic needs, the shipboard operations, and the air control system, a mutual exchange and understanding must exist. This chapter provides an insight into the capabilities and problems of the offensive air support forces in the amphibious operation.

a. Navy Forces.--The Navy element of the amphibious task force (ATF) may include one or more of the following: transport group, control groups, tactical air control groups, fire support group, shore-based Navy tactical air group, support carrier group, screening group, mine warfare group, reconnaissance and underwater demolition group, tactical deception group, inshore undersea warfare group, close covering group, patrol plane group, air transport group, and an administrative group. The function of these units is discussed in LFM 01, Doctrine for Amphibious Operations.

b. Landing Force.--The landing force comprises the troop units, aviation and ground, assigned to conduct the amphibious assault.

c. Air Force Forces.--When Air Force forces are assigned to the amphibious task force, they will be organized as a separate force or component under the command of an Air Force officer. When the preponderance of tactical aviation is provided by the Air Force for the amphibious operation, the Air Force officer will be designated to direct the total air effort. When the preponderance of tactical aviation comes from the Navy or Marine Corps, the overall air effort will be directed by a naval aviator. In either case, the officer so designated will be responsible for the preparation of the amphibious task force air plan.

Section II. EMPLOYMENT OF OFFENSIVE AIR SUPPORT

3201. GENERAL

Offensive air support is employed primarily to provide fire support for the landing force. This fire support may be close in or beyond the FSCL, immediate or preplanned, and neutralizing or destructive in nature. The amount of offensive air support will be determined by the size and scope of the operation, the capabilities of the enemy, and the commander's concept of operation. It must be closely coordinated with other supporting arms such as artillery and naval gunfire, and as closely as possible, meet the needs of the ground commander.

3202. PRINCIPAL CONSIDERATIONS

The principal consideration in the employment of offensive air support aircraft is the concept of operations. Although the commander must be concerned with a myriad of items during the planning phase, some of his more significant considerations are as follows:

a. Aircraft Availability.--The numbers, models, and capabilities of the aircraft assigned.

b. Air Superiority.--Air superiority is necessary to provide security for strike aircraft. The attainment of air superiority may permit the use of some dual purpose (VMFA) aircraft in a close air support or deep air support role which would otherwise be required to provide air-to-air protection for strike aircraft.

c. Location of Aircraft.--If strike aircraft are a considerable distance from the target area, the ordnance load must be decreased to allow more fuel to be carried; also, less time on target will be available.

d. Forecast Weather.--Favorable weather conditions are generally necessary for effective close air support as the types of attacks are influenced by ceiling and visibility. All-weather aircraft, such as the A-6, the ground based radar course directing system, and the RABFAC allow bombing in marginal weather, ensuring limited CAS. Nevertheless, the level and distribution of CAS normally encountered with a MAGTF is significantly restricted by unfavorable weather. Deep air support is less restricted by weather because of the sophisticated systems of the A-6 aircraft, the radar directed bombing through the ASRT's and the absence of friendly troops. However, visual attack aircraft, such as the A-4 and AV-8, can be used more effectively in good weather conditions.

e. Enemy Surface-to-Air Capabilities.--Today's airmen can expect both surface-to-air missiles and a wide range of conventional antiaircraft fire from the enemy. SEAD, evasive tactics, and electronic countermeasures (ECM) must be carefully coordinated when planning air strikes.

f. Air-Sea Rescue.--Coordination for rescue in the event of a downed aircraft or aircrew is a principal consideration. Rescue combat air patrols (RESCAPS) and helicopters should be made available for this purpose.

g. Aircrew Proficiency.--The commander must consider the capabilities of his aircrews. Sufficient numbers of aircrews to allow proper rest and their level of experience are both significant for complex and/or prolonged operations.

h. Types of Ordnance Available.--The many types of weapons available to the Marine Corps today can provide a great degree of flexibility for the commander. Sophisticated weapons, such as the laser and TV guided bombs, allow greater standoff distance and greater accuracy. CBU's allow coverage of area targets and provide a higher probability of success when engaging point targets.

i. Communications.--Positive and reliable communications between aircraft and controlling agencies is essential for safe and efficient conduct of the mission.

j. Response.--Effective air support is responsive to the needs of the ground commander.

3203. CONCEPT OF OPERATIONS

The overriding factor for the employment of offensive air support is the concept of operations. The plan for landing the assault troops, the scheme of maneuver ashore, the landing force objectives, and the amphibious task force mission will dictate the degree of offensive air support required. Once these have been determined, the TAC will formulate his own plan of how the strike aircraft will be employed. The TAC's concept of operations will include operations prior to, during, and after the amphibious landing. It should also include anticipated requirements for air if the landing force remains ashore after the amphibious assault is terminated.

3204. METHODS OF EMPLOYMENT

The methods of employing offensive air support aircraft are determined by the considerations listed in paragraph 3202. In essence, it depends upon what is available, where the assets are located, what the requirements are, and the capabilities of the enemy.

a. Visual Bombing.--Both close and deep air support are most frequently accomplished by visually locating the target and delivering ordnance under the terminal control of an AFAC or FAC during CAS and under the control of the flight leader during deep air support. These missions are usually preplanned and the ordnance is predetermined for the type of target assigned; e.g., general purpose bombs for enemy facilities, rockets or cannons for enemy troops, and delayed fusing for bunkers.

b. All-Weather Bombing.--Sophisticated systems in aircraft and related equipment have created significant flexibility in offensive air support. Radar and computers, both airborne and on the ground, allow ordnance delivery on targets protected from visual attack aircraft because of bad weather or darkness. Visual attack aircraft, such as the A-4, can be employed at night if illumination is provided, or in conjunction with the ASRT when weather restricts visibility.

c. Early Phasing Ashore.--If offensive air support aircraft are phased ashore early, the response time for on-call missions is significantly decreased.

d. Ground and Airborne Alerts.--Most offensive air support missions are preplanned. Targets are assigned as they are located through intelligence sources and reconnaissance flights. As the operation progresses, however, targets are identified that pose an immediate threat to ground troops, facilities, or aircraft and must be neutralized or destroyed as quickly as possible. Aircraft are placed on ground and/or airborne alert to accommodate these on-call missions. The air alert requires a significant number of aircraft to maintain a minimum of one section (two aircraft) on station. Also, air refueling may be required if the airborne alert station is a long distance from the operating base and/or an extended time on station is desired.

e. A detailed discussion on the employment of attack aircraft is found in section V of this chapter.

3205. FUNCTIONAL INTEGRATION

a. General.--Efficient coordination of the diverse elements of the aviation element of a MAGTF requires a complex, yet flexible, control system --the MACCS. Each MACCS agency, in addition to performing its primary function, may also participate in functions that are the main responsibility of another agency. For example, the DASC controls air operations directly supporting friendly ground forces; yet, the DASC also plays a role in air defense by disseminating air defense alert conditions to ground forces. Conversely, the TAOC, primarily an air defense agency, plays a major supporting role in close air support operations by providing en route flight following for attack aircraft. By adjusting to a changing combat environment, the MACCS provides the required services that the tactical situation dictates.

b. Definitions and Agency Relationships.--To describe the control of aircraft and missiles, some basic definitions and an understanding of air control agency relationships is needed. All organizations which include aviation elements exercise the function of control to some degree. The type of control exercised by designated air control agencies (e.g., command, air direction, air control, and terminal control) help identify the tasks of specific agencies. (See fig. 19.)

	TACC	TADC	TAOC	DASC	ASRT	TACP	TAC (A)	HC (A)	FAC (A)	FAC	LZCT	FLT LDR
COMMAND	X											
AIR DIRECTION		X	X	X		X	X	X				
AIR CONTROL			X	X	X	X	X		X	X	X	X
TERMINAL CONTROL					X	X	X		X	X	X	X

Figure 19.--Types of Control and Associated Agencies.

(1) Definitions

(a) Command.--"The authority which a commander in the military service lawfully exercises over his subordinates by virtue of rank or assignment. Command includes the authority and responsibility for effectively using available resources and for employment planning, organizing, directing, coordinating, and controlling military forces for the accomplishment of assigned missions...."

(b) Control.--"Authority which may be less than full command exercised by a commander over part of the activities of subordinate or other organizations."

(c) Air Direction.--The supervisory activity exercised by an agency over aircraft and missiles to regulate and determine the specific employment necessary to maintain a balance between available air resources and user demands; also, to determine in conjunction with the user, the priorities assigned for their usage.

(d) Air Control.--The act of directing the maneuver of aircraft by personnel using radio, radar, or other means external to an aircraft.

(e) Air Controller.--"An individual especially trained for and assigned the duty of the control (by use of radio, radar, or other means) of such aircraft as may be allotted to him for operation within his area."

(f) Air Control Agency.--An organization possessing the capability for the control and direction of aircraft while maintaining a corresponding capability to coordinate such control and direction with other agencies, both air and ground.

(g) Airspace Control

1 Airspace control consists of the coordination, integration, and regulation of all aircraft within an airspace of defined proportions. In this context:

a Coordination is considered as that degree of authority necessary to achieve effective and flexible use of airspace involving less than command authority over each aircraft operating in that airspace.

b Integration refers to the necessity to consolidate requirements for the use of this airspace in the interest of achieving its most effective use.

c Regulations indicate the requirement to supervise activities in this airspace through the use of standardized procedures to ensure coherent use of that airspace.

2 Airspace control's primary purpose is to provide a service that ensures maximum flexibility of action and efficient use of air assets. It is not intended to delay or confuse air operations.

(h) Terminal (Air) Controller.--An air controller located near the scene of activity to assist assigned aircraft in accomplishing a specific mission.

(2) Agency Relationships.--The relationships that exist between the various agencies can be best defined in the context of the type of control each agency exercises. For this discussion, the various types of control are defined as:

(a) Command.--The one MACCS agency which exercises command is the TACC. In this role, the TACC acts as the command post of the TAC, who is the designated aviation representative of the MAGTF commander.

(b) Air Direction.--Air direction is the most common form of control exercised by the major MACCS control agencies. The process of regulation, determination of employment, and maintaining balance between assets and priorities is complex. Air direction starts with the preparation of the daily fragmentary (frag) order by the senior air element's headquarters (e.g., in an MAF operation, it will be the aircraft wing headquarters). Subsequent air direction tasks include, but are not limited to, aircraft status checks for pending missions, reassignment of airborne assets to higher priority missions, processing of air support requests, collection of information concerning mission status, aircrew briefings, and the exchange of other pertinent information among appropriate control agencies. Air direction, therefore, is the management of a finite number of aircraft and control agency assets for the accomplishment of the aviation mission. Inefficient air direction results in poor aircraft utilization and excessive response times. Air direction requires a large volume of information and a pervasive communication network. Air direction also includes the authority to adjust mission assignments within previously designated parameters due to changes in the air or ground situation. The TACC, TADC, TAOC, DASC, TAC(A), and HC(A) are the MACCS agencies which perform air direction.

(c) Air Control.--Air control is performed when an air controller actually maneuvers an aircraft by directing the pilot. In contrast to air direction, air control does not require the same quantity of information from multiple sources. In most instances, the information is predominantly single mission related and the communications are between the aircrew and the air controller. Tasks dealing with the actual maneuver of aircraft are air control tasks. The TAOC, ASRT, TACP, FAC, LZCT, AFAC, and the flight leader perform the air control function.

(d) Terminal Control.--Air control and air direction involve activity by major MACCS agencies. This activity, however, ceases upon assumption of control by a terminal controller. The significant details of terminal control are prescribed according to the type of mission. Terminal control is actually a subset of air control and applies to those MACCS agencies which control the delivery of ordnance, cargo, or personnel by aircraft to a specific geographic location or air target. The distinction between air control and terminal control is significant for purposes of classification and definition. The training is specialized and differs from that performed by other air controllers. Even though they are part of the MACCS, some terminal control agencies are not organic to the aviation element (e.g., TACP). However, they are fully integrated into the system through communications, doctrine, and MAGTF procedures. The terminal controller's task is to control the weapons system during the actual delivery.

Actual delivery is usually the task of the weapons system commander. There are exceptions to this general rule; e.g., ASRT. Under normal circumstances, terminal control is considered separate from weapons system operation. The control of a helicopter touching down in a landing zone is an example of terminal control.

Section III. PREPARATION

3301. GENERAL

Tactical air operations in support of an amphibious operation are primarily directed towards gaining and maintaining air superiority, destroying and/or neutralizing enemy ground capabilities in the objective area, and responding to particular and immediate needs of the assault elements of the landing force. This and subsequent sections discuss the general sequence of execution of the amphibious operation and the aviation tasks which are to be performed in support of this type of operation. Training, rehearsals, and security will be reviewed.

3302. TRAINING

Training for tactical air operations in support of the amphibious assault is an extension of the regular training programs of all concerned elements. Special emphasis is placed on those phases of training most pertinent to the projected operation, and the effort is concentrated on specific problems anticipated in the operation. All units must become thoroughly familiar with air support techniques and control procedures. Communication equipment is tested as control units, air units, and ground units train together to become thoroughly familiar with their individual capabilities and limitations. Command post exercises (CPX's) for all command and control echelons of the air-ground task force are conducted when possible. Training stresses any special environmental conditions that may exist in the objective area; i.e., extremes in weather and/or terrain.

3303. REHEARSALS

Landing force aviation units participate in rehearsals to perfect communications required for command and control and to familiarize themselves with all aspects of the amphibious plans. The site of the rehearsal is selected to provide for radio communication checks within the bounds of security. An area with a land mass similar to the objective area is desirable to provide a further evaluation of the predicted radio and radar coverage. The decision as to the number and types of rehearsals is governed by the assigned tasks of the different forces, the time available, and the degree of coordination required.

3304. OPERATIONS SECURITY

a. The similarity between the rehearsal and the actual operation necessitates that strict security measures be enforced during rehearsals. The selection of and arrangements for the use of the areas in which rehearsals are to be held must be discretely conducted. Deceptive measures may be necessary to ensure the security of the rehearsal.

b. Observation by unauthorized personnel or unauthorized communications by personnel of the amphibious task force with external agencies must be prevented. The isolation of personnel and ships and the establishment of security perimeter patrols around the rehearsal area, both at sea and ashore, are the primary means of achieving security. Special precautions must also be taken to achieve secure communications.

c. Within the amphibious task force, special security and counterintelligence measures may include such measures as these:

(1) Establishment of secure planning area.

(2) Use of code names and symbols.

(3) Special classification of material used in planning.

(4) Restrictions on dissemination of intelligence, information, and completed plans.

(5) Communication and electronic security.

(6) Cover and deception plans.

(7) Measures for handling civilians.

(8) Armed forces censorship.

(9) Control of accredited correspondents to include field press censorship.

(10) Measures to counter subversion, espionage, and sabotage directed against the amphibious task force.

(11) Security of classified documents and material.

Section IV. EXECUTION

3401. GENERAL

Offensive air support, executed during an amphibious operation, is categorized in terms of pre-D-day, D-day, and post-D-day operations. If landing force aviation remains in the area after the amphibious assault has been terminated, there will be a fourth category--postassault phase operations. Each category has tasks that are geared, but not limited to, that specific phase of the amphibious operation.

a. Target Classification and Priority.--Information on targets must be adequate to determine the relative importance of a target and the volume and type of fires required for the desired effect. Target analysis commences with the receipt of initial information on the enemy and the area of operations and is incorporated into an appropriate target list. Collection and analysis continues throughout the operation with continual updating of the target list. The target list is compiled according to the following classifications and priorities:

(1) Target Classifications.--Target classifications include:

(a) Class A.--Targets which jeopardize the amphibious task force through their threat to shipping, aircraft, minesweeping, and underwater demolitions operations.

(b) Class B.--Targets which affect the ATF by threatening the landing force in the ship-to-shore movement and/or the beach assault.

(c) Class C.--Targets which affect landing force operations ashore and facilitate continued enemy resistance.

(d) Class D.--Targets not to be attacked prior to D-day.

(e) Class E.--Targets restricted by the CATF which will not be destroyed, except upon direct order.

(2) Target Priorities.--Within each target classification, the following priorities are assigned:

(a) Priority I.--Targets capable of preventing the execution of the plan of action.

(b) Priority II.--Targets capable of immediate serious interference with the plan of action.

(c) Priority III.--Targets capable of ultimate serious interference with the execution of the plan of action.

(d) Priority IV.--Targets capable of limited interference with the execution of the plan of action.

b. Target Information.--Requests for target information originate from many sources: from the supporting force or from the forces being supported. When an air support request is received by the aviation component, the operations section will request that the intelligence section evaluate and compile the available data on the selected target. The air combat intelligence branch of the intelligence section, in conjunction with the photo-imagery interpretation branch, will compile and evaluate all information on the target. Target files and target dossiers will be consulted for each target. The intelligence section then prepares and transmits a concise package of all pertinent intelligence on the target to the tactical aircraft groups upon approval of the mission. The specific target information consists of the following:

(1) Imagery of the target.

(2) Flak analysis of the target air defenses showing recommended routes in and out.

(3) Special target information, including any annotations intended to aid in target identification.

(4) Enemy electronic order of battle (EOB).

(5) Enemy air order of battle.

c. Target Analysis.--The senior aviation intelligence section will analyze target vulnerability and worth based upon aircraft reconnaissance, target files, flak charts, and reports. This is accomplished by the intelligence section from interpretation of photographs taken by the aviation component's reconnaissance aircraft or acquired from higher commands, or from intelligence taken from target files and/or dossiers. The intelligence section will analyze flak charts and reports. This enables the intelligence section to keep the operations section abreast of the best possible approach and retirement lanes into particular targets. The information is passed on to the operations section, who performs the following functions relative to the tactical operations:

(1) Selects the target.

(2) Selects the ordnance.

(3) Determines the number of sorties required based upon the probabilities and damage level desired.

d. Target Selection.--Targets are selected by the operations section after the analysis has been completed by the intelligence section. The operations section then prepares a complete package; i.e., target, force requirements, ordnance selection to be used, tactics to be employed, for presentation to the landing force aviation commander. For preparation of target lists, see FMFM 2-1, Intelligence.

(1) The operations section determines when and what forces will be available for the strike. This information is arrived at by using an aircraft utilization worksheet. This completed form then becomes the basis for the warning order and the frag order which are issued daily to the subordinate units for the following day's operations.

(2) The operations section will plan the organization of the strike units, rendezvous points, and approach routes to the targets. The operations section will not direct the type of formations to be used on the

mission, but they will exercise certain coordination to ensure that the targets are hit at the proper time, that the different subordinate units understand who is leading the strike, and that all units of a particular type are employing similar tactics.

e. Ordnance Selection.--The type, size, and delivery method of ordnance is selected upon consideration of the nature of the target area, weather, and the desired degree of damage. Publications have been prepared to assist the planner in determining the ordnance load, type aircraft, aircraft configuration, and the number of sorties required for a specific level of damage against a selected type of target (see fig. 20.) In addition, when selecting aircraft ordnance, the following factors are considered:

(1) The vulnerability of a target to attack.

(2) The desired method of delivery. The method of delivery is usually arrived at by comparing the optimum delivery techniques against the effects of active enemy air defense upon aircraft survivability. This comparison analyzes the following:

(a) Standoff Requirement.--Enemy weapons in the target area which jeopardize delivery aircraft safety.

(b) Weather.--Target area weather affects the accuracy of delivery. Further, it affects the control and number of aircraft which may be utilized due to cloud cover and restricted visibility.

(c) Ordnance.--Availability of ordnance by type will dictate its usage.

(d) Aircraft.--The number and type of aircraft available will influence the delivery method and the ordnance selected.

(3) The types of aviation ordnance are compared with the accuracy and circular error probable (CEP) of the delivery squadron in order to determine the degree of damage that can be expected against a target. The FMFM 5-2 series, Joint Munitions Effectiveness Manuals, list all conventional weapons and the damage effect that can be expected against a variety of targets. This can be translated to sorties required to achieve the desired damage level.

f. Briefing and Debriefing.--Prior to embarking on tactical air missions, combat pilots and crews are briefed by the intelligence and operations officers. Such briefings are conducted to ensure that they have the information needed to execute their assigned missions. Upon completion of the mission, pilots and crews are debriefed. Such debriefings supply valuable information regarding the execution of the mission and its effect upon the enemy, enemy resistance encountered, and enemy tactics and techniques. This information can be of material assistance in planning and executing future air and ground operations.

g. Conduct of Briefings.--Briefings are oral combat orders. As such, they are a function of command. They should be concisely worded, factual presentations of information to include all essential data necessary for the successful completion of the combat air mission. The preparation and conduct of the briefing is the staff responsibility of the operations and intelligence sections, with assistance provided from other staff sections

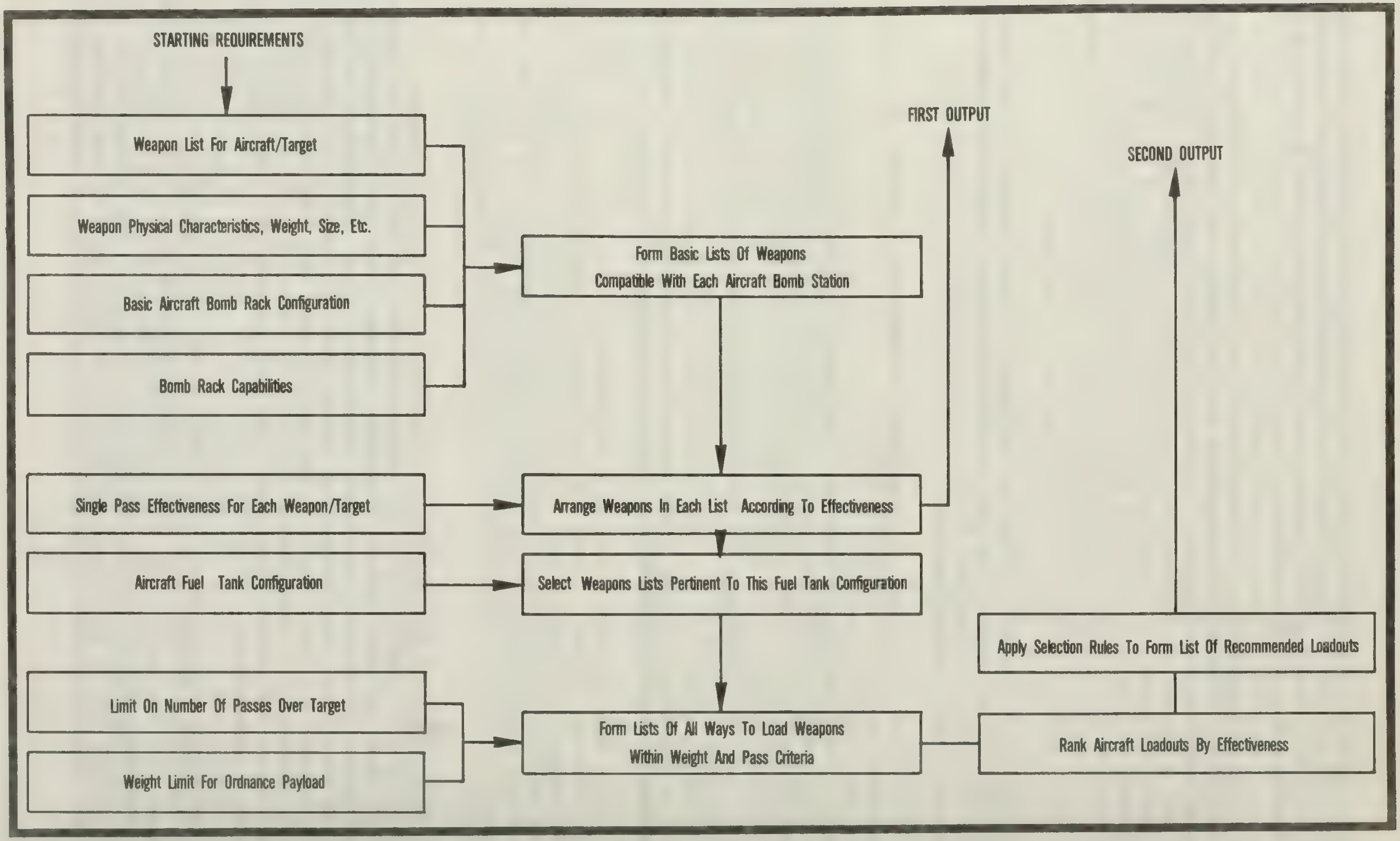

STARTING REQUIREMENTS
Weapon List For Aircraft/Target
Weapon Physical Characteristics, Weight, Size, Etc.
Basic Aircraft Bomb Rack Configuration
Bomb Rack Capabilities
Single Pass Effectiveness For Each Weapon/Target
Aircraft Fuel Tank Configuration
Limit On Number Of Passes Over Target
Weight Limit For Ordnance Payload
Form Basic Lists Of Weapons Compatible With Each Aircraft Bomb Station
Arrange Weapons In Each List According To Effectiveness
Select Weapons Lists Pertinent To This Fuel Tank Configuration
Form Lists Of All Ways To Load Weapons Within Weight And Pass Criteria
FIRST OUTPUT
SECOND OUTPUT
Apply Selection Rules To Form List Of Recommended Loadouts
Rank Aircraft Loadouts By Effectiveness

Figure 20.--Ordnance Selection Process.

as required. The normal briefing staff is composed of four officers: operations, intelligence, communications, and aerology. Small, routine missions may be briefed by a single officer. Combat briefings are generally conducted at the group level since this is the level in Marine aviation which normally has available all pertinent intelligence information pertaining to assigned missions. This briefing is generally attended by all participating personnel. Depending upon the number of pilots involved, only flight leaders or their personnel may attend this briefing if so directed. Upon completion of the group briefing, additional briefings as necessary are then conducted at squadron level. In addition to the group and squadron briefings, it is normal for each flight leader to augment the general briefings with a briefing concerning specific details applicable to his assigned flight. Information to be included in a combat briefing generally includes:

(1) Target information and means of target identification.

(2) Type and extent of target damage desired with instructions as to proper ordnance selection and fuze settings.

(3) Flak analysis of the target area and the routes to and from the target area.

(4) An appraisal of enemy electronics countermeasures that could affect the mission.

(5) A description of the character of the indigenous population and pertinent escape and evasion material.

(6) Weather briefing as to the target area, the routes to and from the target, and probable weather at the recovery or home base upon return.

(7) Information concerning authentications, codes, signals, passwords, terrain, and survival.

(8) Other pertinent essential elements of information (EEI's) of the commanders for overall intelligence information.

h. Conduct of Debriefings.--Debriefing is the process of collecting information about the enemy from combat crews. The debriefing usually includes any information relating to the results of the assigned mission, information required by the collecting plan of higher echelons, air and ground enemy action, unusual sightings, weather and friendly losses or damage caused by enemy action. By debriefing combat crews, the air intelligence officer obtains valuable information concerning the enemy order of battle; enemy reaction; enemy tactical and technical developments; any new enemy forces, equipment, etc., that were observed; and other information of a similar nature.

i. Aircraft Reporting In/Out (RIO) Procedures.--All aircraft report in to the TACC when entering, departing, or operating within the objective area, except when directed to report directly to a subordinate control agency. When pilots have completed their mission, they check out with the same agency or agencies. These reports, referred to as "reporting in/out" information, are maintained by the concerned control agencies until the pilot has checked out and the information has been recorded. RIO information will vary in content depending on the aircraft mission and control agency concerned. Similarly, information transmitted to the pilot upon reporting in will depend on his mission and the control agency involved. Tactical air traffic control (TATC) nets are the communication means used for the exchange of this information. Pertinent information on preplanned missions and ground alert aircraft is provided to the air control agencies by daily fragmentary orders, the MAGTF aviation element headquarters, the MAG's, and the other control agencies. This information is updated as necessary, displayed in each air control center for ready reference, and sequentially completed as aircraft launch, execute missions, and land. Each major air control center maintains current status information on appropriate preplanned, ground alert, and airborne aircraft. RIO information comprises an essential part of this status information vital to the success of the MACCS.

j. Communications.--An effective exchange of information between the ground and air elements of an MAGTF is vital for the success of the mission. Because there are many functions within Marine aviation involving ground and air coordination, many communication nets are required to provide the vehicles for exchanging information. If air support is to be responsive, both the air and ground commander must have a thorough knowledge of the communication nets needed and how they should be used. For detailed information concerning MAW communications, consult FMFM 10-1, Communications. The Navy-Marine Corps close air support command and control network is shown in figure 21.

(1) Needs of the Ground Commander.--The ground commander, to satisfy his offensive air support requirements, must be prepared to communicate via the following means:

(a) Tactical Air Request (TAR) Net.--The TAR net is established by the DASC for providing the TACP with a direct line of communication for close air support. It is monitored by the division, regiment, and battalion TACP's and also by the ASRT's.

(b) Land Line.--A land line link is normally established between the FSCC and the DASC to accomplish coordination in the areas of flight safety.

(c) Visual Means.--Various visual means of communication will be used by the ground commander's representatives as an aid in controlling aircraft. These means may include signal smoke, star clusters, visual panels, lights, mirrors, and other aids that may be visually identified from the air.

(2) Needs of the Air Commander.--Once the requirement for air support has been established through the TAR or HR nets, the air commander must have a vehicle to process the request and control the aircraft assigned to the mission.

(a) Processing CAS Requests.--The request for CAS or direct air support (DAS) is accomplished through the tactical air command net. It is activated by the TACC and will be used to procure the assets to meet the requirements of the ground commander.

(b) Controlling Offensive Air Support.--The aircraft obtained through the TAC net are directed to the target or terminal controller via

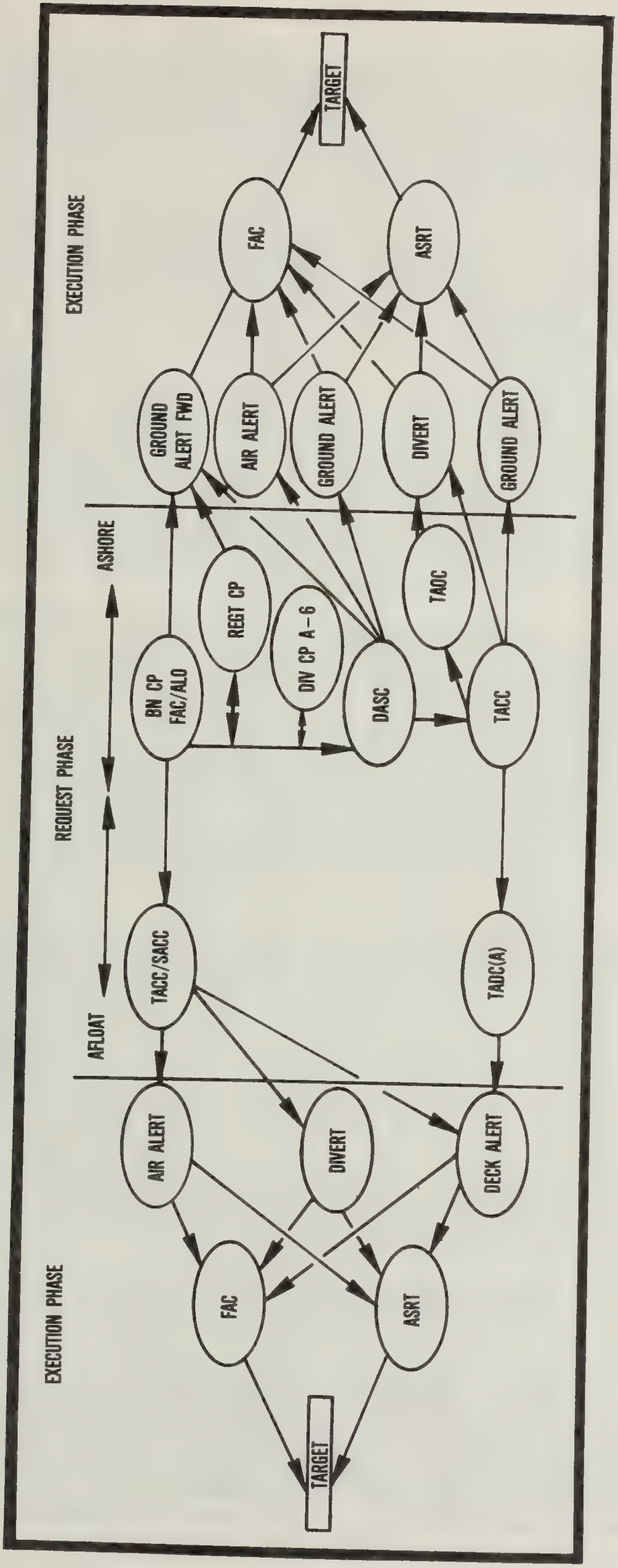


Figure 21.--Navy/Marine Corps Close Air Support Command and Control Network.

the tactical air direction net. The aircraft must have the necessary information to perform the assigned mission. This information might include navigational assistance, target brief, and advisories concerning inflight safety. When aircraft arrive in the target area, control will be shifted to the terminal controller.

(3) Communication With Agencies External to the MAGTF.--The nature of air control is such that a requirement exists for communication with agencies external to the MAGTF. For a discussion of this requirement, see FMFM 5-1, Marine Aviation.

3402. PRE-D-DAY OPERATIONS

During the preparation of the landing area for the amphibious assault, AAW operations are intensified to destroy the enemy's air potential and to gain air superiority in the objective area. Once air superiority is attained, offensive air support missions are conducted against enemy installations on and in the vicinity of the landing beaches, helicopter approach and retirement lanes, helicopter landing zones, concentrations of enemy troops, enemy gun emplacements, and vehicle convoys. Additionally, strikes are conducted against targets of opportunity.

a. Collection of Target Information.--During the planning phase of an amphibious operation, information relating to enemy airfields, communication systems, and other installations is obtained from amphibious objective studies and from target lists maintained by fleet commanders, the commander amphibious task force, and landing force aviation. Information concerning recently developed enemy installations, and deployment and movement of enemy forces is provided by amphibious reconnaissance elements and by friendly agents within the objective area. Information is also gained by employment of aerial photographic and electronic reconnaissance means. By carefully evaluating the information collected from all sources, the most important deep air support targets are selected.

b. Deep Air Support.--Deep air support is air action conducted against enemy targets at such distance from friendly forces that detailed integration of each air mission with fire and movement of friendly forces is not required. Deep air support is normally conducted beyond the fire support coordination line, and beyond the range of the preponderance of other supporting arms. Targets in deep air support include the enemy's fighting forces, equipment and supplies, communication systems, and support installations. Deep air support missions are normally coordinated and controlled exclusively at higher echelons of command and are of lesser immediate concern to the ground elements than close air support missions. Simply stated, deep air support operations are directed against enemy targets not in the immediate vicinity of friendly forces and conducted for the purpose of isolation of the battlefield and destruction of enemy forces.

c. Aerial Interdiction.--Aerial interdiction is one of the most important tasks of Marine aviation units in the deep air support role. Its purpose is to isolate, restrict, or deny to the enemy, use of a particular area, route, or facility. Aerial interdiction operations generally achieve greatest success when the ground battle is characterized by great movement and strong offensive pressure by either combatant. During these tactical situations, the enemy rate of consumption of supplies and movement of troops and equipment are greatly increased resulting in lucrative targets for aerial interdiction of rail and road nets. All-weather Marine Corps aircraft provide a 24-hour-a-day capability to interdict the enemy's reinforcement and supply routes. For example, enemy armor presents one of the greatest threats to the success of an amphibious operation and aerial interdiction missions are one of the most effective means to combat this threat because of aerial mobility to mass large numbers of aircraft and flexibility in the types and amount of ordnance. When the supply consumption of an armored division is considered, it can readily be seen how interdiction by aircraft can prevent the constant flow of logistic support that is necessary to an armored unit's effectiveness.

d. Destruction of Enemy Forces.--Destruction missions are conducted for the broad purpose of destroying the enemy, his equipment and supplies, his installations, and his personnel. When the movement of the enemy has been hindered by interdiction, he must be attacked in place to accomplish destruction. Weapon and fuze combinations are selectively employed to effect the destruction of the enemy's means of resisting the landing force. Failure to make proper ordnance selections will result in the utilization of all aviation assets without measurably affecting the enemy's capability to resist. Reference must be made to the FMFM 5-2 series, Joint Munitions Effectiveness Manual, to ascertain which weapon and what method of employment is necessary to destroy a given target. Emphasis will be given to to enemy concentrations and emplacements nearest the landing beaches/zones and along the approach and retirement lanes.

3403. D-DAY OPERATIONS

On the day the landing commences, offensive air support operations, which began prior to D-day, continue. Neutralization attacks continue in the landing area until immediately prior to the landing of the leading waves. After landing, airstrikes are shifted to other selected targets to provide assault elements continuing support. All available attack aircraft, including F-4's not engaged in AAW missions, are assigned specific targets or areas which pose a threat to the landing force. Airstrikes emanate outward from the landing beaches or zones for deep air support, including interdiction of enemy formations, convoys, and lines of communication.

a. Airstrikes Prior to H-Hour.--On D-day, prior to H-hour, numerous airstrikes are made on the landing beaches to inflict maximum damage to enemy defenses. These strikes consist of bombing, strafing, rocket, incendiary, or nuclear attacks.

(1) Rocket and Bomb Attacks.--These attacks are made against selected targets derived from the latest intelligence. Emphasis is placed on armored or revetted installations capable of bringing direct fire to bear on the landing beaches and their approaches.

(2) Strafing and Incendiary Attacks.--These attacks are executed as the landing craft and helicopters make their final approach to their respective beach or zone. Once the troops have landed, terminal air support control agencies with the assault elements (FAC) or airborne (AFAC), direct strike aircraft to targets in the immediate vicinity of, and beyond, the landing beaches, or outward from the helicopter landing zones.

(3) Ordnance Delivery.--Offensive air support aircraft are becoming more vulnerable to antiaircraft artillery (AAA) and surface-to-air missiles. Attacks that run parallel to frontlines and those attacks that run deep in enemy territory may result in extensive exposure to the antiair threat. In this type of environment, it may be more desirable to alter CAS delivery tactics so that attacks are made perpendicular to the

FEBA, with a pullout prior to crossing frontlines. Although this procedure does not provide maximum safety for friendly troops, it may prevent excessive aircraft losses to enemy fire. TV and laser-guided weapons have increased standoff distance for deep air support missions by allowing weapon release outside of AAA and some SAM envelopes. During any offensive air support operation, however, a compromise must be made between maximum effect of the weapons used and minimum exposure to enemy fire.

b. Typical Time Schedule for H-Hour Strikes

(1) H-60 Minutes to H-35 Minutes.--Rocket and bomb attacks are conducted on targets on and close to the landing beaches.

(2) H-35 Minutes to H-20 Minutes.--Incendiary attacks are conducted on the beach and flanks.

(3) H-10 Minutes to H-5 Minutes.--Smoke missions are executed to conceal movement of approaching boat waves.

(4) H-4 Minutes to H-3 Minutes.--Strafing attacks are conducted along beaches, moving inland as the assault waves advance ashore.

c. Adjustment of Time and Type of Attacks.--The time and type of air attacks in support of the amphibious assault may be changed as required because of varying local conditions or fluctuations in the speed of the landing craft in the first assault wave. Once the landing craft are within 1,000 meters of the beach, their position, rather than time, becomes the governing factor in the execution of the close air support operations. After the H-hour airstrikes have been completed, support aircraft on station continue to attack enemy defenses opposing the landing force.

d. Close Air Support After H-Hour.--As the ground troops advance ashore, CAS operations must be very closely coordinated and controlled. These operations will be both preplanned and on call. Preplanned airstrikes will cover the advancement of the assault forces, directing their fire at targets pinpointed by forward air controllers, both on the ground and airborne. When additional targets are discovered, or when resistance is greater than anticipated, additional aircraft are called from ground or airborne alerts, or diverted from other missions to supplement the prescheduled aircraft already on station.

(1) Preplanned Missions.--A preplanned mission is an airstrike on a target which can be anticipated sufficiently in advance to permit detailed mission coordination and planning. They are scheduled missions to be executed when specifically requested by the supported unit. Positive approval at each intermediate command level is required prior to execution of a preplanned mission. When initiating a preplanned mission request, the requester will complete section I of the request form (see app. A), and forward it through the requester's channels to the TACC. The ground commander may specify in his request the following types of air support response desired:

(a) Specific time on target (TOT).

(b) Specific ordnance.

(c) Airborne or ground alert.

(d) Air support radar team or radar beacon delivery.

(2) Immediate (On-Call) Missions.--An immediate or on-call mission is an airstrike on a target which could not be identified sufficiently in advance to permit detailed mission coordination and planning. Immediate missions may be provided by ground or airborne alerts, or by diverting aircraft from a preplanned mission. The requester will complete section I of the request form (see app. A). Tactical air control parties forward the data to the DASC or the TACC.

(3) Mission Briefing for Immediate or On-Call Missions

(a) If time and mission urgency permit, the flight is briefed prior to scramble. If not, the mission is briefed after the flight is airborne. Pilots should be provided:

1 Mission number.

2 Estimated TOT.

3 Control point/rendezvous coordinates/navigational aid (NAVAID) fix.

4 Initial contact (call sign and frequency).

5 FAC/ASRT/TAC(A) call sign and frequency.

6 Restrictive fire/air plan information.

7 Target description.

8 Target coordinates and elevation.

(b) When a flight is diverted or is on airborne alert, the briefing will be given by the appropriate control element while the aircraft is orbiting or is en route to the target.

(4) Terminal Control Procedures.--Terminal control is provided by any of several agencies (TACP, TAC(A), AFAC, or ASRT) with the approval of the supported ground commander. It begins with the arrival of the flight at the contact point and is carried out as follows, unless modified by the operation plan.

(a) The flight leader will initiate radio contact with the FAC or AFAC using the designated call sign and frequency and providing the following information:

1 Flight call sign.

2 Mission number.

3 Number and type of aircraft.

4 Ordnance (and fuzing, if not instantaneous).

5 Position and altitude.

6 Time to BINGO.

(b) The FAC or AFAC will provide the flight with information necessary for the attack. The following minimum information will be briefed to the flight in standardized format:

1 Target location and description.

2 Target elevation.

3 Attack instructions.

4 Target and friendly location information that contributes to safe conduct of the mission, including restrictive fire/air plan (when necessary.)

(c) The FAC will visually acquire the flight if possible, except in emergency.

(d) The flight observes the FAC's position, if possible, or will visually acquire the AFAC's aircraft (when applicable) prior to commencing the attack.

(e) The flight acquires the target (and friendly positions when they are a safety factor).

(f) Each member of the flight attacks the target and delivers ordnance only when cleared by the FAC (or AFAC).

e. Fixed-Wing Support of Helicopters.--Offensive air support aircraft may be tasked to provide helicopter escort and deliver fires for landing zone preparation.

(1) Helicopter Escort Missions

(a) Armed escort should be provided for all helicopter assault movements, unless the routes and landing zones are known to be secure. Five general types of helicopter missions require armed or attack escort:

1 Escort of assault transport helicopters through and into areas not secure or controlled by enemy forces.

2 Escort and attack cover of resupply helicopters flying through insecure areas into secure sites controlled by friendly forces.

3 Aircraft on station to cover retrieval of downed helicopters.

4 Escort of medical evacuation flights into insecure zones.

5 Cover and escort of reconnsissance insertion or extraction operations.

(b) Overall mission control of aircraft involved in helicopter assaults is exercised by the tactical air commander through the TADC and DASC. Fixed-wing escorts will be passed to a DASC from TAOC to receive mission, rendezvous, and communication instructions. Although mission control will be with the DASC, direct control will be by airborne coordinators or the transport helicopter commander. If employed, the TAC(A) has overall control of all aircraft in support of and conducting the helicopter assault. The helicopter coordinator (airborne) has control of all helicopters involved in the assault, or if an HC(A) is not assigned, the helicopter transport commander. AFAC directs airstrikes in the landing zone area. Fixed-wing aircraft escorting resupply helicopters will be controlled by the TAC(A). If attacks near the landing zone are needed prior to the helicopter landings, control of fixed-wing escorts can be passed to the AFAC for direction of such strikes. If the escorts are not required for prelanding strikes of the landing zone, they may be employed as air alert cover over the landing zone under TAC(A) or AFAC control.

(2) Weather Factors.--Weather must be carefully considered during planning of fixed-wing supported helicopterborne operations. Low ceilings and poor visibility severely curtail fixed-wing operations, especially in their ability to deliver ordnance. Preparatory landing zone strikes generally require ceiling and visibility minimums of 2,500 feet and 3 miles. Effective escort operations in adverse weather conditions rely heavily on the terrain and the altitude of the helicopter formation. A minimum of 500 feet is required between the helicopters and the ceiling for fixed-wing to maneuver. Terrain clearance between the base of the clouds and the high ground en route is also a major controlling factor. If adverse weather prevents landing zone preparation and/or sufficient maneuvering room for helicopter escorts, it may be advisable to postpone or cancel the helicopter operation.

3404. POST-D-DAY OPERATIONS

Post-D-day air support operations are planned in general terms since mission requirements depend upon the development of the ground tactical situation. Applicable pre-D-day and D-day type operations continue. Plans must provide continuous and adequate support for landing force operations progressing ashore including the transition from carrier-based to land-based air support. In those instances where there are no suitable airfield facilities within the amphibious objective area (AOA), the air element of the landing force will establish expeditionary facilities from resources available to each MAG. The various expeditionary airfield components have been designed in such a manner as to permit the tactical commander to have maximum flexibility for assembling a variety of airfield configurations. This flexibility provides the opportunity to initially install VTOL forward sites and V/STOL forward operating facilities, and subsequently to expand these facilities, building-block fashion, into full-scale expeditionary airfields. The expeditionary airfield components may be picked up and moved within the AOA and are recoverable for future use. Additional V/STOL considerations may be found in section VIII.

a. Phasing of Control Ashore.--As soon as practical, the CLF establishes air control facilities ashore in order to provide increased surveillance, more rapid response, and a landward extension of the ATF's weapons control capabilities. Initially, air control agencies ashore operate in a standby status monitoring all air control circuits. Once the agencies ashore are satisfactorily established, the tactical air situation allows, and upon recommendation of the CLF, the CATF decides whether to phase responsibility for air control ashore and according to what type and degree. As the MACCS becomes functional, the CATF may pass all or portions of air control responsibility to the CLF. In a continuing sequence, the agencies afloat are relieved of responsibility but continue to monitor the appropriate categories of control, participating when necessary. Regardless of the degree of participation, these afloat agencies will remain prepared to act as backup or alternate agencies until the termination of the amphibious operation.

b. Phasing Direct Air Support Control Ashore.--Facilities for the control of direct air support are phased ashore in proportion to the buildup of the landing force ashore.

(1) Tactical Air Control Party.--The TACP's are the first elements of MACCS ashore. FAC parties of the battalion TACP's generally accompany frontline companies during all phases of the amphibious operation. During the initial phase of the assault, the FAC controls aircraft executing missions in support of the battalion. Aircraft are provided by the TACC (afloat). Following the establishment of the DASC ashore, aircraft will be requested from and provided by the DASC.

(2) Direct Air Support Center.--In order to assist in the coordination of supporting arms and to provide an agency ashore for the control and direction of direct air support, the first aviation air control agency to go ashore is normally the DASC. The DASC is usually landed in the same manner, and at approximately the same time, as the senior ground combat fire support coordination center and collocates with this FSCC provided that this FSCC has the assigned responsibility for controlling supporting arms. The specific composition of the DASC will be tailored to meet the situation, but in all cases, it has the capability to control and direct required direct air support missions. Passing the responsibility for the control and direction of direct air support ashore most logically occurs when the necessary facilities have been established and the beachhead has become relatively secure. At this time, some degree of stabilization in the volume of close air support, air reconnaissance, and assault support missions will have evolved. The decision to formally activate the DASC is based upon the recommendations of the CLF and the tactical air officer to the CATF. This activation depends upon the tactical situation and the success of the DASC in establishing the necessary facilities, particularly communications, to gain an adequate grasp of the existing air situation. The DASC then, gradually begins to participate in the control and direction of direct air support missions. The most readily identifiable starting point for this participation is with immediate air request missions and those preplanned flights whose mission requires close coordination with other fire support means. As the DASC assumes this responsibility, it processes requests from TACP's, AFAC's, NAO's, HC(A)'s, etc. Air resources, made available by the TACC (afloat) and the HDC, are assigned to terminal control agencies. From this point, the DASC continues to assume a greater responsibility for the control and direction of direct air support, expanding its capacity until it is capable of, and has been assigned, the responsibility for handling all missions. This status is normally attained by the time the preponderance of landing force artillery is ashore and is functioning through the senior FSCC assigned the responsibility for controlling supporting arms.

(3) Air Support Radar Team.--Should the situation dictate, one or more ASRT's are established ashore to provide all weather, close support bombing control. The DASC provides operational direction of and mission assignment to the ASRT. Initial mission assignment to the ASRT is made by the TACC (afloat) and coordinated through the DASC. Subsequent mission assignment is made by the Marine TACC/TADC, once established ashore. The force antiair warfare coordinator/sector antiair warfare coordinator (FAAWC/SAAWC) conducts the radar controlled handover of aircraft to the ASRT until the landing force air surveillance radar system is established ashore.

(4) Tactical Air Operation Center.--As the beachhead expands, air defense elements of the MACCS are phasing ashore. The introduction of other functional control elements ashore, in addition to the DASC, requires centralized coordination of MACCS functions to preclude mutual interference and to attain unity of effort. Although the primary responsibility of the TAOC is to establish the control and direction facilities for the landing force air defense system, it has the capability to perform limited functions as a TADC. This capability is primarily limited to the processing of fixed-wing aircraft, including those conducting direct air support missions while coordinating with the TACC (afloat) and the DASC. The control and direction of helicopters continues to be exercised by the HDC and the DASC. This TADC responsibility is assumed by the actual TADC (ashore) when established.

(5) Tactical Air Command Center/Tactical Air Direction Center.--Generally, the last MACCS agency activated is the TACC/TADC. The facilities for the TACC/TADC may be established ashore concurrently with other MACCS agencies; e.g., TAOC. This agency, when activated, is initially designated a TADC and functions under the cognizance of the TACC (afloat). The TADC is the senior MACCS agency and is responsible for the centralized command and direction of the activities of its subordinate agencies in the MACCS. This includes all direct air support operation. If and when the responsibility for the control and direction of all air operations in the objective area is passed to the CLF by the CATF, the TADC is designated as the TACC. The TACC (afloat) is simultaneously redesignated a TADC, subordinate to the TACC (ashore).

c. Coordination of Air Support With Other Fire Support Means.--The characteristics of aircraft, particularly their mobility, require that specific attention be given to their integration with other fire support means. Simply orbiting on station may take close air support aircraft across battalion and even regimental boundaries. The activity of these aircraft must be coordinated to meet force priorities and safety requirements with other air activity. Due to problems imposed by aircraft availability and their speed of movement, control is centralized at the highest level of the MAGTF. This centralization is required to ensure economical use of resources and to provide flexible response for the entire MAGTF ground combat element. Centralization of control dictates a process wherein air support is requested from a central, functional, control agency, the DASC in the case of direct air support. Immediate and on-call requests to the DASC are screened by intermediate ground command echelons for approval. The significance of this requesting procedure is that each intermediate echelon must examine the location and status of any artillery or naval gunfire missions in progress, the availability and suitability of other supporting arms for the mission, and other requirements for available air support within their area of responsibility. The process of approval allows higher echelons the opportunity to disapprove when more pressing requirements for air support exist elsewhere or when higher priority fire missions would have to be either checked or terminated in order to accomplish the requested air mission. Fire support coordinators at each echelon also compare the type and location of the target with the type aircraft and requested ordnance. This comparison is for followup purposes and does not delay the approval or disapproval. Provisions of this nature are established within the MAGTF to ensure flexibility and rapid integration of air with other supporting arms. In order to accommodate this function, a specific agency has been established within the MAGTF structure where all supporting arms activity of the particular unit is centrally reviewed, approved, coordinated, and displayed. Further, general control measures are employed which allow rapid and effective coordination when necessary.

(1) Fire Support Coordination Center.--The various FSCC's are the commander's agencies tasked to stay abreast of the supporting arms effort and to perform the necessary coordination. They are the only agencies which combine the communications and personnel required to plan, receive, process, implement, and forward information concerning artillery, air, and naval gunfire activity. The FSCC is a staff agency at each level of infantry command from the battalion through the command element of the largest MAGTF, the Marine amphibious force. Staffed by representatives of each of the supporting arms, FSCC personnel are closely attuned to the intentions of the commander and represent his interests in fire coordination matters. For decisions beyond their assigned responsibility, they establish immediate contact with the commander. They consolidate the summary information on supporting arms activity and assign the necessary control measures for continuous fire support.

(2) Coordination and Control.--Coordination and control measures delineate responsibility, restrict and control fires, and complement the effort of higher and adjacent units. Aircraft are subject to limitations in the execution of their missions in much the same manner as ground units. In the case of air support operations, the FSCL, airspace coordination areas, and SEAD requirements are of greatest concern and importance. These measures ensure that the ground commander maintains airspace utilization approval authority over his immediate airspace and that safety requirements for both aircraft and ground forces are met.

(a) Fire Support Coordination Line.--The FSCL is a line established by the appropriate ground commander to ensure coordination of fire not under his control but which may affect current tactical operations. The fire support coordination line is used to coordinate fires of air, ground, or sea weapons systems using any type of ammunition against surface targets. The fire support coordination line should follow well defined terrain features. The establishment of the FSCL must be coordinated with the appropriate tactical air commander and other supporting elements. Supporting elements may attack targets forward of the FSCL, without prior coordination with the ground force commander, provided the attack will not produce adverse surface effects on, or to the rear of, the line. The FSCL is normally located at the extreme ranges of artillery and naval gunfire. Inside the FSCL, coordination with other supporting arms is necessary and attack of targets must be coordinated with the appropriate ground commander. As a fire coordination control means, it serves the following two purposes:

1 Provides ground commanders with sufficient control of aircraft to ensure troop safety, aircraft safety, and coordination of airstrikes with ground maneuver; and precludes unnecessary duplication of supporting fires.

2 Provides aviation commanders, air control agencies, and pilots of aircraft with sufficient information to clearly delineate the degree of control or coordination required for aircraft to attack ground targets in the area.

(b) Airspace Coordination Area.--The ACA is a block of airspace in the target area in which friendly aircraft are reasonably safe from friendly surface fires. The ACA may occasionally be a formal measure (a three-dimensional box in the sky). Information included in dissemination, if a formal measure, will provide minimum/maximum altitude, length (two coordinates), width, effective date-time group (DTG). A typical ACA is illustrated in figure 22.

(c) Suppression of Enemy Air Defenses.--SEAD techniques are closely related to counterbattery fires and are employed in support of close air support aircraft. SEAD fires are directed against hostile anti-aircraft weapons that can fire on close air support aircraft during the

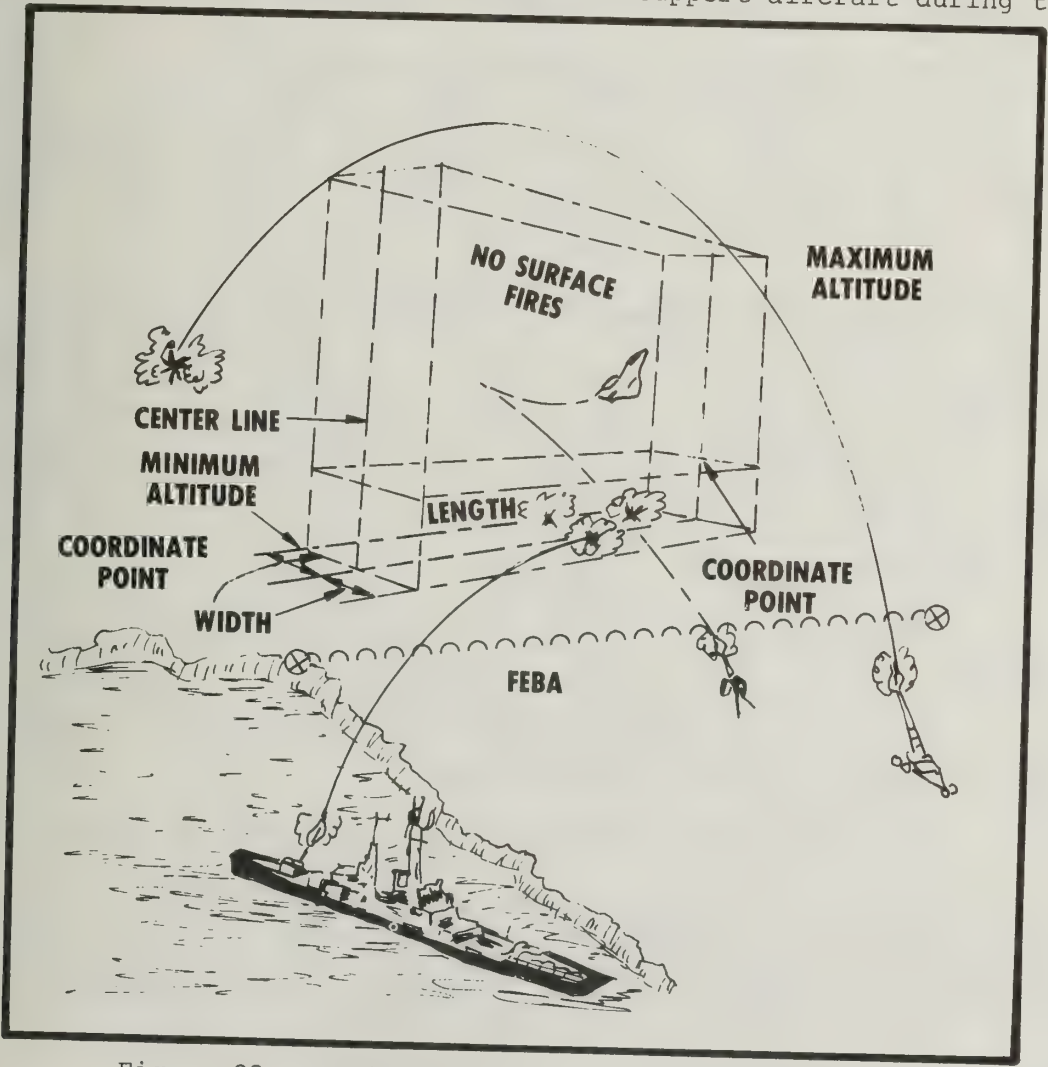


Figure 22.--Typical Airspace Coordination Area.

execution of their missions. SEAD fires are primarily delivered by artillery units; however, naval gunfire and other support aircraft possess this capability and may be employed to deliver these fires. Because of the detailed and close coordination required, SEAD fires are planned, coordinated, and controlled by the appropriate FSCC. The aviation representative in the FSCC plays a most important part in the planning of these missions. He is responsible for the preparation and use of SEAD templates that represent the area and time each type of aircraft will be vulnerable to antiaircraft fires during certain types of attacks. Approach and recovery distances vary somewhat with the type of attack (bombing, strafing, napalm, etc.), as well as with the type aircraft, speed, and special flight characteristics. The key to a successful SEAD mission lies in thorough planning and positive control of its execution. The SEAD mission is controlled directly by the forward air controller, airborne FAC, forward observer (FO), and/or when naval gunfire is utilized, by the shore fire control party (SFCP). These controlling agencies can be located side by side in an observation post or tied in with "hot lines" to ensure instant reaction. When aircraft are used in a SEAD role, control is provided by a TAC(A), FAC, or AFAC.

d. Conduct of Offensive Air Support Operations.--Offensive air support operations consist of a sequence of events designed to provide timely response to the air needs of the ground commander. The functional control agency for these operations is the DASC, collocated with the highest level FSCC assigned the responsibility for controlling supporting arms. This collocation enables the DASC to supervise and control the conduct of the offensive air support missions and to coordinate this air activity with other fire support means. In order to receive preplanned direct air support, the ground combat element consolidates its requests and forwards them to the MAGTF commander. The MAGTF commander then determines the mix of preplanned and immediate sorties by comparing the requests against the aircraft availabilities furnished by the aviation element. The determination of this mix is based upon a comparison of anticipated tactical requirements against the number of requests received. In a conventional warfare environment, preplanning for requirements is simplified by the relative stability of the situation. In other combat environments, particularly counterinsurgency, the identification of targets and the defining of requirements for preplanned status is more difficult due to the fluidity of the situation, plus the requirement to react to a number of potential situations. Immediate or on-call type missions provide optimum response in this instance. Therefore, care must be taken to limit preplanned mission requests to those which are definitely required. A problem sometimes encountered in such situations is indiscriminate preplanned targeting by units to assure availability of aircraft. This procedure draws down assets available for immediate missions. When the preplanned/immediate mission has been determined, the aviation element assigns the missions, ordnance, controlling agencies, and time on target, or time on station (TOS).

(1) Area Relationships.--Chapter 2 described the various agencies of the MACCS and defined the DASC's responsibility for overall coordination and execution of direct air support missions. The DASC is best suited to exercise this function for a division/wing combat team and is assigned responsibility for the offensive air support activity within a division's area of responsibility. Within that area, the DASC is the senior offensive air support functional agency and reports directly to the TACC/TADC. For operations involving more than one division, the assets of the MASS and the capacities of its DASC are usually insufficient to adequately provide for the increased span of control. Therefore, additional

DASC and ASRT capability must be provided, either by assignment of an additional MASS to the MAGTF, or by substantial personnel and equipment augmentation for the existing MASS. Under these circumstances, the TACC/TADC continues to provide overall supervision of the offensive air support control effort while ensuring that both DASC's effect coordination for matters of mutual concern. This relationship parallels that of adjacent TAOC's described in chapter 3.

(a) Areas of Responsibility.--In establishing the DASC, areas of responsibility of both the DASC and the supported ground unit is of paramount concern. The DASC must be located in such a geographic position that it will be able to control aircraft throughout its area of responsibility. It should be recognized that there may be instances whereby the DASC does not have the capability to control aircraft throughout the entire area of responsibilty of the major ground combat element it is supporting. In such an instance, the DASC's area of responsibility should not be arbitrarily extended to conform to the area of responsibility of the major ground unt supported by that DASC. Such a situation exists in a fluid environment when subordinate ground combat units operate at extended distances from the major ground combat element. Consequently, a number of factors must be considered to determine if a requirement exists for a second DASC capability. This includes the scope and length of the operation, distance of the ground units from the DASC, and the geographical characteristics of the area. Where such a need is identified, the requirement may be met by assigning the responsibility for offensive air support to an adjacent DASC or by establishing another complete DASC.

(b) Decentralization of Offensive Air Support Control.--In an operation where the MAGTF employs one DASC, the MACCS provides for decentralization of offensive air support control to this DASC. An operation involving two divisions would require two DASC's. Similarly, a division operation involving a sizeable subordinate element detached from the main ground element, such as a task force, would also require the use of a second DASC. In these two situations, one DASC cannot adequately support the entire MAGTF ground combat element in performing the necessary offensive air support control and fire support coordination tasks. When the size and tactical employment of the MAGTF ground combat element dictates the decentralization of fire support coordination, the offensive air support control function must be correspondingly decentralized by the establishment of additional DASC's. In this manner, specified ground combat elements receive an accompanying offensive air support control and coordination capability. The varying configurations of the SASC perform their functions within their capabilities for the supported organization. In all cases, overall command and control of the MAGTF air assets remains centralized in the TACC/TADC, while subordinate offensive air support control agencies provide decentralized control according to specified operational guidelines. In this manner, adequate response to the offensive air support needs of the entire MAGTF is ensured.

(2) Providing Direct Air Support.--In providing direct air support to requesting units, the process is twofold. The first involves determining the appropriate mix for immediate and preplanned missions and its subsequent assignment. The second involves the method and authority to divert preplanned missions once airborne.

(a) Preplanned/Immediate.--The allocation process provides for the assignment of aircraft to a preplanned/immediate mix. Preplanned missions and requirements for aircraft on standby alert are assigned to specific aviation units by a daily fragmentary operation order. The same frag order is distributed to the TACC/TADC, TAOC, and the DASC. The frag order also designates the anticipated terminal control agency for scheduled missions; e.g., FAC, AFAC, TAC(A), and ASRT. Readiness conditions for the aircraft on alert and hot pad locations are also specified. The DASC confirms the preplanned missions with the appropriate terminal air support control agency and ensures that the terminal controller is prepared to receive his scheduled missions.

(b) Diverts.--Should an occasion arise in which the terminal controller cannot work his scheduled missions, provisions have to be made for another terminal controller to be assigned the scheduled air or the mission is cancelled. In many instances, the unavailability of a terminal controller to accept missions cannot be determined until the flight is airborne. Similarly, emergency or high priority situations will arise which require offensive air support response at that time. In both of these instances, the requirement for flexibility dictates that air control agencies be capable of diverting missions to another terminal controller or to the location of the emergency or priority mission. Three general parameters affect the decentralization of offensive air support authority to the various air control agencies:

1 Available Resources.--If available aviation resources exceed requests for direct air support, divert authority need not be exercised unless time is extremely critical. Generally speaking, response times of on-call ground alert aircraft usually equal the time required by the DASC to contact a terminal controller and aircraft, to disengage the aircraft from its present mission, and for the aircraft to proceed to the location of the higher priority mission. An exception to this is when aircraft coincidentally report in for a preplanned mission just as the higher priority request is received. However, if resources are limited and the activity of ground alert aircraft is high, the only existing alternative is to divert aircraft from a lower priority mission in order to meet the need. It should be noted here, that when such a situation arises, the DASC's proximity to the senior air representative with the ground combat element allows decreased reaction time while preserving the supported unit's ability to make their own determination as to where and how assigned air will be employed.

2 Sources of Requests.--The sources of requests will also condition the level of decentralization of divert authority. In an amphibious operation, problems are minor because all requests are processed through ground combat element TACP's. However, the key factor is identification of the agency which ultimately receives all the requests from all the authorized requesting agencies. In any joint or extended operation, provision must be made to accommodate the receipt of requests for both immediate and preplanned direct air support from parallel ground combat elements and from elements external to the ground combat elements of the MAGTF involved; e.g., the combat service support (CSS) elements. Normally, in these instances, general divert authority should remain with the agency ultimately receiving all requests; for only at that level can relative priorities be properly identified. An exception to the normal rule which increases responsiveness and reduces reaction time should be to decentralize divert authority to a major combat element's air control agency for the block of aircraft received regularly on a daily basis. In the previously quoted examples of two or more equal and parallel ground combat elements or a using combat service support element, the TACC/TADC would

retain overall divert authority to meet priorities assigned by the MAGTF command element. Simultaneously, and to ensure minimum reaction time, it could also assign divert authority for regularly fragged assets to each DASC in the case of two or more equal ground combat elements, or to the ground combat element's DASC, in the case where other users are administrative and/or logistic in nature. Such decentralization ensures tactical responsiveness, but does not preclude an overall capability to rapidly respond to nontactical requirements.

3 Type of Aircraft.--A third conditioning factor in the decision to decentralize divert authority is the type of aircraft involved. A relatively complex decision making process may be acceptable for aircraft with high endurance on station. Frequently, aircraft characteristics, the distance of the target from air bases, and the time on station required necessitates immediate decisions concerning mission assignment. Therefore, many situations will dictate that the controlling DASC be empowered with divert authority over all scheduled missions. The DASC is in the best position to rapidly identify changing situations, receive these changes directly from the supported ground combat element, and communicate directly with all of the ground combat element's terminal controllers.

(3) Air Requests.--The process of requesting preplanned direct air support has been previously discussed. This paragraph will discuss the process of requesting immediate direct air support missions.

(a) Types of Air Requests.--Immediate direct air support involves requests for fixed-wing air support. Requests may involve close air support aircraft, nighttime flare drops, or other missions such as harassment and interdiction.

(b) Sources of Air Requests.--The majority of immediate air requests are made by the FAC's of ground combat units, but requests may originate from other sources such as the TACC, FSCC, and TAC(A). Requests are initially made by the FAC to the DASC on the prescribed net for the type of aircraft required; i.e., tactical air request for fixed-wing. Air officers at intermediate FSCC's monitor the request nets and indicate approval by their silence. The request itself contains a logical and sequential arrangement of the information required to conduct the mission. See appendix A for a standardized tactical air request and appendix C for a CAS briefing form. Further, requesting agencies are responsible to know aircraft capabilities and the weather minimums for the general types of missions.

(c) Processing Air Requests.--The DASC assigns a request number to each request form which includes the information passed by the requesting agency. The request is then matched against the availability of aircraft for immediate response. If the priority of the request allows, preplanned missions are also considered if their scheduled ordnance loads are appropriate. Airspace coordination areas, fire support missions, and other limiting factors which may be unknown to the requester must be reviewed. If the request is received on other than the TAR net, the DASC coordinates with the appropriate FSCC to ensure concurrence on the use of close air support. The DASC assists in planning SEAD fires and ACA's, and ensures aircraft are cleared for entry into the ground commander's airspace. The senior air director (SAD) in the DASC is responsible for finally approving the method of filling the request and for ensuring the necessary fire support coordination. If all sources of aircraft available to the DASC are exhausted, the DASC requests aircraft from the TACC. Once aircraft are assigned, the DASC confirms the controlling agency and assigns the tactical air direction (TAD) frequency for the mission.

(4) Mission Briefing.--Once aircraft assignments for air requests are completed, the DASC briefs all participating elements according to the type of mission and the terminal control agency's familiarity with the specific mission.

(a) Requesting Agencies.--The DASC briefs requesting agencies on the status of approved requests. This briefing includes the number and type aircraft, aircraft call signs and mission numbers, ordnance load (if applicable), estimated TOT or TOS, and the call sign and frequency of the terminal control agency. The DASC further keeps all requesting agencies informed of delays, modifications, or cancellations which arise. If a request cannot be filled, the DASC briefs the requesting agency immediately and, whenever possible, notes the reason for inability to comply. This allows the requesting agency to make alternate plans or to reevaluate factors which might have precluded filling the request; e.g., assigned priority.

(b) Terminal Control Agencies.--The DASC is responsible to brief terminal control agencies on the details of each mission. Each terminal control agency has specific briefing requirements which must be met. The FAC's, AFAC's, TAC(A)'s, and the ASRT's are the terminal control agencies for close air support.

1 Forward Air Controller.--Usually the FAC controlling a mission is the requesting agency and therefore has the necessary information on the target coordinates, target description, location of proximate friendly units, and aircraft heading restrictions, if appropriate. The FAC receives the following information from the DASC:

a Number and type of aircraft.

b Aircraft call signs and mission numbers.

c Ordnance load.

d Estimated TOT.

e Assigned orbit point and altitude (if applicable).

f Assigned TAD net

g Airspace coordination areas/fire support coordination measures in effect.

2 Tactical Air Coordinator (Airborne) and Airborne Forward Air Controller.--The TAC(A)/AFAC is often working with the ground unit which has requested air support and already possesses the necessary target information. TAC(A)'s working independently and requesting aircraft for targets of opportunity also possess this target information. If the TAC(A) is not aware of the request, a briefing will be provided by the DASC. When providing CAS to a ground unit, the TAC(A)/AFAC is instructed to contact that ground unit. The TAC(A)/AFAC requires the following information to conduct his mission:

a Call sign and frequency of supported unit.

b Location of proximate friendly units.

c Target coordinates and description.

d Time when the target is cleared for air attack.

e The information described in subparagraph 1 above.

3 Air Support Radar Team.--The ASRT as a subordinate agency to the DASC is not usually in contact with the supported unit. Further, its function of medium and high altitude, close support bombing control may dictate that it control multiple aircraft over a large area in a relatively short period of time. The ASRT requires the previously described briefing on the assigned aircraft and the following additional information:

a Target number.

b Target coordinates (eight digits).

c Target description to include size and configuration for area targets.

d Target precedence.

e Time frame target is cleared for strike.

f Restrictive run in headings (if applicable).

g Mission type (close or deep air support, harassment, interdiction, or destruction).

h Friendly unit locations or populated areas close to the target.

i Specified GCI/ASRT handover frequency.

(c) Aircrews.--The DASC briefs aircrews of support aircraft on the missions assigned. Reporting in/out procedures are discussed in paragraph 3401i.

(d) Close Air Support.--A general briefing is given to CAS aircraft which outlines the general parameters of the mission. A detailed briefing is given by the terminal control agency once the aircraft arrive at their assigned position. The DASC passes the following information to the aircrew:

1 Type mission.

2 Call sign and type of terminal controller.

3 Orbit point and altitude.

4 Airspace coordination area.

5 Target description.

6 Location of other aircraft in the target vicinity.

7 Control frequency.

(5) Execution.--There are three phases applicable to mission execution. These are control of aircraft to the terminal control agency, control of aircraft by the terminal control agency, and control of aircraft from the terminal control agency.

(a) En Route Control to Terminal Control.--The process of en route control requires coordination of the aircraft flight path with other airspace utilization activities. Flight to the terminal control area may involve transiting airspace being utilized by other offensive air support aircraft, other fire support means, and other aviation activity, such as air defense or air reconnaissance. Two agencies are primarily employed for this control:

1 TAOC.--The TAOC has the capability of providing positive radar control or radar flight following services to offensive air support aircraft. Such control is limited for aircraft flying at low altitude due to radar limitations and geographical characteristics of the area. TAOC en route control to a terminal control agency is integrated with air defense aircraft and missile activity. Control may consist of a radio and/or radar handover to an intermediate control agency, such as another TAOC or a DASC, or a handover direct to a terminal control agency, such as an ASRT.

2 DASC.--The DASC maintains current information on the coordinated fire line (CFL), fire support coordination line, restrictive fire line (RFL), and airspace coordination areas. It has the capability to safely vector aircraft throughout its area of responsibility.

a Depending upon the geographic location of the units involved, aircraft may check in with the DASC shortly after takeoff. When the pilot advises the DASC of his mission, present position, altitude, and destination, a determination can be made as to the best route for the aircraft. Aircraft transiting a DASC's area are provided flight path vectoring information in distance and radials from a tactical air navigation (TACAN) station or in grid coordinates. Aircraft reporting to the DASC for assignment to a terminal control agency are given a safe flight path to a point at which they can be received by the terminal control agency.

b When an aircraft has a requirement to enter or transit an area in which there is artillery firing and/or naval gunfire, the DASC determines if it is feasible to vector the aircraft around, over, or under the firing. If a safe vector is not posible, the DASC notifies the FSCC of the aircraft's mission, position, altitude, and destination and requests a "check fire" on the artillery/naval gunfire mission which would present a hazard to the aircraft. The DASC notifies the FSCC immediately when the area is clear of aircraft to permit resumption of firing. To facilitate the fire support coordination process, the DASC keeps the FSCC informed of planned tracks or routes of aircraft; e.g., reconnaissance aircraft. This information includes the coordinates of the track or route, the mission and altitude of the flight, and the inclusive time that the flight will be in the area. This permits the FSCC to anticipate and more efficiently plan fire support coordination requirements.

(b) Terminal Control.--The conduct of terminal control is dependent upon the type mission and type of control agency involved. The principal terminal control agencies for offensive air support are the TAC(A), AFAC, FAC, and ASRT. In most cases, positioning of aircraft for handover to a terminal control agency is accomplished by the DASC. In the case of the ASRT, a radar handover by the TAOC is common. Once aircraft have been handed over to a terminal control agency, primary responsibility for the safety of the aircraft and coordination with other aircraft and supporting arms rests with this terminal control agency. However, significant assistance is given these agencies by other MACCS agencies. For example, an ASRT close support bombing control mission may be simultaneously given flight following by the TAOC; the DASC ensures that no aircraft are vectored into an area in which a TAC(A) or FAC is controlling a CAS mission.

1 TAC(A)/AFAC.--Upon receipt of aircraft for control, the TAC(A)/AFAC establishes identification and assigns an orbit point. Usually, the orbit altitude is not assigned unless the presence of other flights require altitude assignment in a "stack." Under these conditions, the TAC(A)/AC anticipates each mission and calls the next flight down to working altitude shortly before it is needed. During the conduct of a series of strikes, the TAC(A)/AFAC maintains a continuing bomb damage assessment (BDA) and passes it to the attack pilots upon mission completion. Should time not allow, the BDA is passed directly to the DASC after departure of the strike aircraft. The TAC(A)/AFAC clears each flight onto the target and advises the pilots of other aircraft near the flight path or enemy fire directed at the striking aircraft. From his position of being able to observe strike aircraft runs, the target area, and friendly forces, the TAC(A)/AFAC advises both aircraft and ground units of useful information which might influence or enhance the immediate tactical situation. Additional information of which the TAC(A)/AFAC advises strike aircraft is:

a Weather, cloud cover, visibility, wind direction, and velocity.

b General nature of anticipated targets.

c Type of enemy ground fire anticipated.

d Time factors and special ordnance information.

e General nature of the terrain, elevation of the target area, highest elevation in proximity to the target.

f The closest air control agency to provide penetration and departure routes, if weather is unfavorable.

g Information concerning present friendly positions in the target area.

2 FAC.--The FAC is briefed by the DASC on the position and altitude of arriving strike aircraft. Upon initial contact with the flight, the FAC briefs the aircraft in a similar manner as a TAC(A) brief. The aircraft are cleared into the ground unit's airspace where the FAC establishes visual contact and assigns an orbit point. At this time, the

process of identifying and marking the target commences. Whenever possible, aircraft run-in headings will parallel friendly force positions, and the FAC establishes these general flight paths as the aircraft orbit. Panels, smoke, and marking rounds are employed to indicate both friendly and target positions. In instances of light ground fire, the FAC may direct aircraft "dummy runs" to identify the target more definitely. The aircraft are cleared onto the target and ordnance is dropped according to the desired sequence. "No-drop" reports are made to the FAC by the aircraft to ensure accurate assessment and to assist the locating of duds. Aircrews and the FAC exchange observed BDA to offset aerial and ground only evaluations and to produce the most comprehensive assessment. Upon completion of the strike, aircraft are cleared out of the area while the FAC notifies the DASC and the appropriate FSCC to permit resumption of other supporting arms activity.

(c) En Route Control From Terminal Control.--En route control of aircraft that have completed work with a terminal control agency is most frequently a reverse application of the process of en route control to their terminal control agency. For example, an aircraft that has received en route control and a radar handoff by a TAOC to an ASRT may receive en route control by the TAOC upon completion of the ASRT mission. This control similarly involves the coordination of the aircraft flight path with other airspace utilization activity. Aircraft control may involve transiting airspace being utilized by other offensive air support aircraft, other fire support means, and other aviation activity, such as air defense or air reconnaissance.

(6) ASRT Operational Characteristics.--The ASRT utilizes a ground based, close support bombing control system which consists of a precision tracking radar and associated computer equipment designed to accurately position aircraft without visual reference to the earth's surface. There are two methods of aircraft control: the voice vector or manual method and the automatic method. In the voice vector method, the ASRT strike controller passes course, altitude, speed, and drop commands to the pilot by ground-to-air radio. In the automatic method, course and drop commands are transmitted to the aircraft by radio data link. Both methods of control may employ two modes of operation: the radar skin track mode or the beacon mode. The radar skin track mode relies on normal radar return and is the more limited in range of the two. The beacon mode involves the utilization of a transponder in the aircraft which is triggered by the transmitted signal from the ASRT's radar course directing central. The transponder, in turn, transmits a signal stronger than what the reflected radar signal in the radar skin track mode would be. This significantly increases the range at which the system can maintain a "lock" on the aircraft and, consequently, the range at which close support bombing control can be conducted.

(7) ASRT Emplacement.--The ASRT is one of the major radar systems used in offensive air support.

(a) Emplacement Considerations.--Emplacement considerations for the ASRT are of both a technical and tactical nature and include the following:

1 Technical.--The technical consideratons for ASRT emplacement are:

a The amount of masking of the radar beam expected from surrounding terrain.

b The proximity of artillery or other equipment which could result in severe concussions or electronic interference with the radar and/or communication equipment.

c The capacity of the site to physically accept the radar subsystem, computer subsystem, communication equipment, generators, and ancillary equipment.

2 Tactical.--The following tactical considerations apply:

a Suitability of the location to adequately provide system coverage of the assigned area of operations.

b Overlap and/or backup area coverage with adjacent ASRT's may be required.

c Distance from the associated DASC may require special measures for the exchange of operational information; e.g., communication measures.

d Accessability of the site for supporting elements to provide logistical and other support.

e Security of the site must be provided.

(b) Emplacement Requirements.--When a proposed site is determined to be tactically and technically adequate, the ASRT survey team is employed to survey the position for the RCDC system. The length of time required to complete the site survey will vary according to the accuracy and availability of existing maps, accessibility to readily identifiable landmarks, etc. The survey, absolutely essential to the establishment of the ASRT, can normally be completed in a relatively short period of time.

(8) ASRT Employment.--Three ASRT's are organic to each MASS. The ASRT is under the operational control and direction of the DASC. All ASRT missions are assigned and coordinated through the DASC. Under the cognizance of the TACC/TADC, the DASC assigns hours of operation to each ASRT which permit the necessary time for maintenance and/or displacement. The TACC/TADC, TAOC, and FSCC are kept advised of the operational status of each ASRT. In addition to its primary mission of close support bombing control, the ASRT may perform other tasks such as paradrops, flare drops, loft bombing, air-to-surface missile delivery, and precision positioning for air reconnaissance. The ASRT is also capable of positioning helicopters over landing zones and providing a limited radar letdown to aircraft.

(a) The ASRT targets are provided to the DASC by the FSCC. The targets are plotted on the DASC's air situation board and are verified for accuracy and completeness by the DASC's SAD. This is one in a series of steps designed to check and recheck target information.

(b) Strikes controlled by the ASRT may be preplanned, immediate, or divert missions. In most instances, immediate and divert missions are directed against observed targets of opportunity or sudden troop contact with enemy units. In some instances, it may be desirable to adjust ASRT drops by a TAC(A)/AFAC, FAC, reconnaissance team, etc. This is accomplished by having the ASRT control an initial strike with only a portion of the aircraft's ordnance to determine accuracy. The observer then provides adjustment information which is furnished the ASRT until desired accuracy is achieved.

(c) The TAOC provides a radar handover of aircraft scheduled to work with the ASRT. The radar handover point is determined by the DASC in conjunction with the TAOC and ASRT and is dependent upon airspace coordination areas, air traffic control requirements, and other tactical considerations.

(d) In order to provide the most accurate bombing possible, the ASRT must possess exact information on target coordinates, aircraft ordnance loads, and ordnance ballistics data. Due to the requirement for accurate ballistics data, normally only "hard" or nonretarded ordnance is employed for ASRT missions.

(9) Conduct of ASRT Missions.--The DASC provides the ASRT's with a schedule of air support missions and specific mission requirements. Once the target and mission data are received, the close support bombing mission is conducted in two phases: preparation and execution.

(a) Preparation.--Whenever possible, the DASC provides the ASRT with a copy of the list of ASRT targets received from the FSCC. When the location of the ASRT precludes the use of a written list, the target data is passed by the DASC by radio, multichannel radio, wire, or other communication means. Targets are plotted by the strike controller or radar operator on the ASRT situation map. Targets which appear to be in a nontarget area or which appear to hazard friendly forces or populated areas are confirmed with the DASC. The fact that targets received by the ASRT are certified as being cleared by appropriate agencies does not mitigate the responsibility of ASRT personnel to meticulously check plotted targets. Two strike controllers or a strike controller and a radar operator separately sight, record, and process the target data. The process requires each to individually obtain the necessary insert data, separately compute the problem, and compare solutions. Once verified, the computer inserts are entered in the prescribed sequence, checked by the radar operator, and read back to the controller. Safety requires the sequence or check to be reinitiated if interrupted.

(b) Execution.--Normally, the TAOC provides a radar handover of strike aircraft to the ASRT and provides radar surveillance during the ASRT run. If a radar handover is not available, the pilot reports his TACAN position to the ASRT until positive radar lock is established.

1 Upon establishment of radio contact, the pilot provides the ASRT with:

a Call sign.

b Mission number.

c Number and type aircraft.

d Amount and type of ordnance, including fin and fuze type.

e Position (in TACAN range and azimuth or range and bearing from landmark or known point).

f Altitude (to nearest 1,000 feet).

g Aircraft configuration for use of ground controlled bombing system (automatic mode) and/or control beacon (beacon mode).

h Time to BINGO.

2 After the aircraft report in, the strike controller may be required to give certain information, such as assigned heading and altitude, in a secure manner. A common method is to designate a classified "base" heading and altitude and to give heading and altitude instructions relative to that "base." The strike controller will:

a Advise the pilot(s) regarding radar contact.

b Vector to attack heading, or give instructions to proceed to orbit point at a specified altitude if there is no radar contact.

c Give attack altitude.

d Give attack true air speed.

e Give command link channel and code (automatic control only).

f Give beacon code if aircraft is equipped with control beacon.

g Give number of runs and ordnance to be delivered on each run.

h Give lost communication procedures.

3 During voice vector runs, after the aircraft has commenced the final attack heading, precise course, speed, and altitude corrections are required from the controller. In the final stages of a run, course and/or altitude changes will result in the aircraft having a lateral velocity and/or a climb or descent rate at the time of bomb release. This will cause greater error than if a slightly off course, but steady, or slightly off altitude, but steady, situation exists.

(10) Mission Assessment.--Upon completion of offensive air support missions, pilots report mission results to the DASC. Mission reports on ASRT controlled aircraft are made by the ASRT to the DASC. All terminal control agencies report mission completion to the DASC as they release aircraft. The DASC consolidates mission assessments and forwards reports to the TACC/TADC and FSCC as required.

(a) Aircraft.--CAS aircraft report mission results, including ordnance expended and BDA. Aircraft are released for return to base if fuel and ordnance status preclude other mission assignments. Fuel and ordnance permitting, aircraft are utilized on another mission or assigned to an orbit point to hold for possible employment. Aircraft such as air reconnaissance flights also report mission completion to the DASC as required.

(b) Terminal Control Agencies.--Terminal control agencies report mission completion and BDA to the DASC. Mission completion reports are essential to allow the DASC to effectively manage its assets and are required from each terminal control agency. Damage assessment may be reported through aircraft, but will be separately submitted whenever possible. Modifications may be forthcoming from FAC's, AFAC's, and TAC(A)'s on damage assessments which were unknown at the time of completion of the strike. Terminal control agencies will provide strike aircraft and the DASC with the following items of damage assessment:

1 Target coordinates.

2 Time on and off target.

3 Percent of hits on target and percent of target covered.

4 Damage.

- a Structures destroyed or damaged.
- b Enemy casualties killed and confirmed.
- c Vehicles (land or waterborne) damaged or destroyed.
- d Weapons or radar positions damaged or destroyed.
- e Bridges or roads/trails damaged or destroyed.
- f Supply caches (by type) damaged or destroyed.
- g Area coverage.
- h General effect on target.
- i Unit supported.
- j Operation supported.

e. Armed Reconnaissance.--As the amphibious assault progresses, the demand for offensive air support increases. The enemy is fully aware of the objective area and will increase his efforts to resupply and reinforce defensive positions. Marine aviation is fully capable of monitoring lines of communication day and night. The moving target indicator (MTI) of the A-6 aircraft and the side-looking radar (SLAR) of the RF-4 allow the observation of roads or highways regardless of visibility. During daylight and when weather permits, A-4, TA-4, AV-8, F-4, and OV-10 aircraft may all participate in the reconnaissance of assigned sectors. When targets such as truck convoys, armored columns, antiaircraft artillery sites, or artillery positions are discovered, the reconnaissance aircraft may attack and/or call in additional strike aircraft with appropriate ordnance aboard. Armed reconnaissance should not be confused with interdiction where a sector is assigned with selected targets such as bridges, road intersections, railroad junctions or trestles, and truck parks. Whereas interdiction is performed to deny the enemy access to the objective area, armed reconnaissance is performed to seek out and destroy the enemy.

f. Antimechanized Support.--The best method of countering the enemy's armor threat is to prevent it from getting to the main battle area. As tanks reach greater levels of sophistication, so do the weapons designed to defeat them. The tube launched, optically tracked, wire command link guided (TOW) missile and other tanks can make the battle area quite ferocious for enemy armor, but antitank measures by the ground units would not be required if enemy armor was stopped en route. Because tanks with sufficient maneuvering room are a difficult target for high performance aircraft, it is desirable to engage them in areas where maneuverability is restricted, such as bridges, canyons, highways, or vehicle parks. Rockets, cannons, and especially armor piercing cluster bombs, such as the Rockeye, are effective against armor. Although direct hits depend upon the circular error of probability of the pilot, aircraft, and weapon, even near misses may break antennaes, clog strainers, or air intakes, and damage the track mechanism. Armor that has its maneuverability restricted, communications cut off, or mobility curtailed is temporarily less effective and more vulnerable to further ground or air attack. If enemy armor does reach the main battle area, air, friendly armor, artillery, antitank missiles, and infantry must combine efforts to neutralize or destroy the threat. If the enemy attacks at night, the antitank missiles can be very effective when flares are dropped behind enemy tanks, providing a good target profile. Under any conditions, when attacking a large number of tanks, an extremely heavy volume of AAA fire, including SAM's, should be anticipated from the enemy armor and supporting arms. Infantry and artillery must combine their efforts to neutralize the enemy air defenses. The enemy air defense umbrella must be eliminated before air support can effectively combat enemy armor.

3405. POSTASSAULT PHASE OPERATIONS

a. Postassault operations commence when the amphibious operation has been terminated. LFM 01, Doctrine for Amphibious Operations, sets the following guidelines for this determination:

(1) The force beachhead has been secured.

(2) Sufficient tactical and supporting forces have been established ashore to ensure the continuous landing of troops and material requisite for subsequent operations.

(3) Command, communications, and supporting arms coordination facilities have been established ashore.

(4) The commander landing force has stated that he is ready to assume full responsibility for subsequent operations.

b. When these conditions have been met, the CLF and CATF will forward a recommendation to the designated higher authority to terminate the amphibious operation. Once the amphibious operation has been terminated, and the ATF dissolved, the CLF will commence postassault phase operations.

c. Upon the termination of the amphibious operation, elements of, or the entire landing force, may be required to remain ashore as an MAGTF and engage in what is essentially land combat. Once established ashore, and upon the termination of the amphibious operation, the MAGTF, as an organization of balanced arms, has the capability to conduct sustained operations. It is essential that in postassault operations the CLF, as the commander, continues to exercise command over both the ground and aviation units.

d. The tasks performed by Marine aviation during the postassault phase will be similar to those performed during the assault phase. The attack and fighter attack aircraft will continue to maintain air superiority and support the ground forces. Postassault phase operations may include additional objectives to be seized by the forces established ashore or maintaining the beachhead line drawn at the time the amphibious assault is terminated. In either case, offensive air support will be a continuation of previous operations. Airfields should be operational within the AOA which will facilitate better response to the ground commanders' CAS requests. Deep air support missions, especially interdiction, will be performed on a continuous basis. Since it may not be feasible to base all aircraft within the AOA, priorities must be established concerning their desired location. In most cases, the capabilities of the aircraft will determine where they should be based. The A-6 would not have to be based near the FEBA because of its long-range and deep air support capabilities. The AV-8, however, has less range, requires little or no runway, and is highly effective in the quick response, CAS role. It would, therefore, be desirable to base the AV-8 within the AOA. If postassault phase operations are expected to continue for a prolonged period, it would be more economical to eventually locate all of landing force aviation within the AOA.

e. Marine aviation, while an element of the MAGTF, is able to integrate with other Service components that are present in the area where combat operations are being conducted. Close coordination between the Marine air commander and the commanders of aviation elements of the other Services, particularly the Air Force component commander, is required. Although this coordination will exist and Marine aviation might even be called upon for some support outside the MAGTF, such support will be with the approval of the MAGTF commander. Also, if the MAGTF commander requires additional support beyond the capabilities of Marine air, he may request coordination and/or support from other service components. Normally, in either case, the MAGTF will be a component of a joint or unified command and perform tasks assigned by a higher authority.

Section V. LOGISTIC SUPPORT CONSIDERATIONS

3501. GENERAL

a. The establishment of Marine aviation ashore poses a major logistic problem involving:

(1) The movement of heavy and complex equipment and combat aircraft by surface and air.

(2) The installation of dispersed facilities, often in relatively underdeveloped areas, which requires an extensive engineer effort.

(3) The movement of great quantities of supplies; principally, fuel, spare parts, and aircraft munitions.

b. When established ashore, units of the Marine aviation element are dispersed over a wide area, perhaps as much as several hundred square miles. Included in this area of operations are a complex of airfields, VTOL and helicopter operating sites, radio and radar installations, antiaircraft missile battalions, command and control agencies, and maintenance and supply facilities. The construction of airfields and the installation of supporting activities will require engineering support which cannot be provided by units organic to Marine aviation.

c. Marine aviation is capable of operating air facilities; maintaining, servicing, and arming assigned aircraft; and storing and handling supplies at the airfields. Construction and repair of operating facilities and distribution of aviation fuel and ordnance from ships to airbases are logistic operations beyond the capabilities of Marine aviation and require external support. This support entails a logistic effort of considerable magnitude. The aviation logistic system must be capable of incremental introduction of supply and support into the objective area at a rate consistent with the tactical situation. A typical phasing ashore will progress from austere operations and logistic requirements to full group/wing sustained operations. The Marine aviation support system, therefore, must be flexible, mobile, and responsive.

3502. SUPPLY AND MAINTENANCE

a. Organization for Supply

(1) The squadron materiel section provides assistance to squadron maintenance personnel in obtaining repair parts. It stores allowance list materiel not being used and maintains a limited amount of high turnover repair parts for support of aircraft.

(2) The supply section of the MAG or independent squadron is responsible for requisition receipt, storage, issue, and accounting for classes I, II, IV, V(A), VI, VII(A), and IX(A) material. Classes III, III(A), and V(A) do not come within the purview of the supply organization of Marine aviation units.

(3) Operating levels of supply held by the supply section of MAG's and independent squadrons are generally as follows:

(a) Classes I, IV, V(A), VI, VIII .... (As directed)

(b) Classes II, IX .... (As directed by cognizant force commanders)

(c) Classes VII(A), IX(A) .... 90 days

b. Supply of Aviation Fuel

(1) Governing Factors.--Aircraft consumption rates and fuel types are the primary governing factors in determining fuel tonnage and volume requirements. Consumption rates vary from 600 to 5,000 pounds per hour, depending upon the aircraft. Total class III(A) requirements for operation of a Marine aircraft wing may exceed 400,000 gallons per day.

(2) Tactical Airfield Fuel Dispensing System.--The engineer squadron of the Marine Corps support group has the mission of providing TAFDS services to the MAW. This includes the task of storage, operation, and training. The basic TAFDS has a capacity of 60,000 gallons.

(3) Fuel Delivery to TAFDS.--The engineer squadron, MWSG is dependent upon other service forces for delivery of fuel to the TAFDS site. In the amphibious assault, naval forces deliver the fuel to the beaches or ports. The force service support group distributes it to the operational units, initially in packaged containers. The delivery in containers is an interim measure, pending activation of an amphibous assault fuel system (AAFS), or the installation of a pipeline.

(4) Amphibious Assault Fuel System.--For support of sustained air operations ashore, it is preferable that the aviation fuel be transferred from the beach, port, or barge unloading points by pipeline to the receiver or interconnected into the AAFS of the landing force. A single AAFS has a storage capability of 600,000 gallons of fuel as well as the transfer pumps, hoses, and collapsible tanks to transfer fuel a distance of 3 miles. Only one type of fuel can be handled in each AAFS system at a time. A single AAFS can be divided into smaller units or subgroups to permit it to handle reduced quantities of several types of fuel, if desired. The maximum distance obtainable through use of multiple AAFS is 24 miles under favorable terrain conditions. Due to normal allocation of available amphibious assault fuel systems for handling different types of fuel at various locations, limitations imposed by terrain and requirements for local security, fuel transfer is generally limited to 3 to 6 miles. A 600,000-gallon system can be installed by a bulk fuel platoon in approximately 48 hours. Dependent upon the availability of service and engineer support, as well as the distance inland to operating bases and airfields, several day's installation time is generally involved.

c. Aviation Ordnance Supply

(1) Like aviation fuel, the expenditure of class V(A) supplies is geared to the tempo of operations. It is proportionate to the sortie rate and to the type of mission. An interceptor mission, for instance, expends less class V(A) tonnage than a close air support mission by attack aircraft. For planning purposes, class V(A) requirements are expressed in days of ammunition. A day of ammunition is further defined as weapons

loads. A weapons load represents the average number of weapons per aircraft per sortie per day. Factors used to compute days of expenditures by aviation units in combat operations and requirements generated by the Navy and Marine Ordnance Requirements Model (NAVMOR) which determines weapons effectiveness, sortie allocations, and weapons mix. The prescribed days of ammunition/weapons loads/mix do not preclude the commander landing force or the landing force aviation commander from altering the stated requirements in terms of the specific tactical situation.

(2) The initial supply of class V(A) is landed with each force service support group (FSSG) in support of the aircraft wing/group and stored at ammunition supply points (ASP's). The H&MS munitions section will move the munitions from the ASP to the munitions buildup area. Resupply of munitions of the ASP is the responsibility of the force service support group.

(3) Nuclear munitions for those units of the MAW to be established ashore present a relatively small logistic problem in terms of tonnage. The Marine wing weapons unit and the munitions may be embarked in assault shipping and landed early in the operation, or the MWWU and the munitions may be brought into the area by fixed-wing transport from bases outside the objective area, if an adequate air facility is in operation. Continuing supply of air-delivered nuclear munitions in the ready condition can be accomplished by air transport. From the standpoint of storage and handling, air delivery is the preferred method of landing such munitions.

d. Aviation Maintenance

(1) The combat capability of Marine squadrons depends, in a large measure, on the maintenance of their aircraft in combat ready condition.

(2) The various levels of aircraft maintenance which affect Marine aviation are defined as:

(a) Organizational Maintenance.--That maintenance performed by the operating unit on a day-to-day basis. Organizational maintenance includes line operations (servicing, daily/preflight inspections, minor adjustments, etc., in preparation for flight), periodic inspections of aircraft and equipment, and the associated tests, repairs, and adjustments which do not require shop facilities. All such work is done in facilities assigned to the operating units on either a joint or individual basis.

(b) Intermediate Maintenance.--That maintenance which is the responsibility of and performed by designated maintenance activities for direct support of using organizations. It normally consists of:

1 Calibration, repair, or replacement of damaged or unserviceable parts, components, or assemblies.

2 Emergency manufacture of unavailable parts.

3 Providing technical assistance to using organizations.

(c) Depot Maintenance.--That type of maintenance which is performed in an industrial type facility. Such facilities may be either military or commercial. Depot maintenance includes overhaul and major repair and modification of aircraft, components, and equipment. It also includes the manufacture of designated aeronautical parts as system spares and the manufacture of kits for the accomplishment of aircraft and equipment modifications. Support is servicewide.

(d) Squadron Level Maintenance.--It is impractical to man and equip each tactical squadron to perform all levels of aircraft maintenance; therefore, aircraft squadrons have a relatively limited aircraft maintenance capability. The period of time during which they can maintain an effective level of aircraft availability is dependent upon the logistic support provided. Squadrons supplied with adequate aircraft, spare parts, fuel, ammunition, liquid oxygen, and certain electronics test equipment can operate for extended periods.

1 Squadrons are limited to the use of hand tools for the repair of aircraft damage. They can remove and replace armament, but cannot repair, service, or test it. They normally carry the necessary tools and equipment to remove and install engines. They are able to tune and test aircraft electronics components using portable test equipment which includes frequency setting and "go-no-go" instruments only. Further testing, when required, will be conducted by the H&MS.

2 The equipment necessary to maintain and service the aircraft, plus a small supply of high usage spare parts, comprise the bulk of the class II(A) and class IX(A) equipment and supplies required to operate a squadron.

3 The squadron aircraft maintenance section, with its equipment, is embarked with the surface echelon in either assault shipping or followup shipping and normally lands after general unloading commences. It is desirable to have this element of the squadron landed and in position prior to the arrival of the squadron in the objective area. Normally, the ground elements of the fixed-wing squadrons are landed by waterborne landing craft. However, the majority of the equipment is helicopter transportable and this method of landing may be employed.

(e) Group-Level Maintenance.--Group-level intermediate maintenance is performed by the H&MS. This squadron can repair, service, and test aircraft armaments and has facilities to perform engine buildup. Group-level maintenance can remove and replace aircraft electrical wiring and cabling and has equipment for the detailed bench test and repair of certain aircraft electrical components. In the event that the MAG is to be deployed independently from normal wing maintenance and supply support, aeronautical material and equipment allowances must be specifically designed to support the deployment. Personnel and equipment, to provide the group-level maintenance capability, are embarked with the surface echelon of the group in either assault or followup shipping, depending upon the time schedule for establishing the units of the Marine aircraft wing ashore. Elements of the group headquarters and maintenance squadron are not usually landed during the first several days of the operation. Operating conditions in the objective area influence the time of landing and, consequently, the establishment of group-level maintenance facilities ashore.

1 Aircraft Maintenance Section, H&MS.--The aircraft maintenance section of an H&MS of a typical fighter/attack group includes a much larger percentage of skilled technicians among the personnel assigned than does the aircraft maintenance section of the tactical squadron.

2 Supply Section, H&MS.--A companion section of the group headquarters and maintenance squadron, which must be landed and in operation before complete group-level maintenance can be provided to support the tactical squadrons, is the group supply section. This section provides aircraft spare parts and consumable aeronautical supplies which are necessary for group-level maintenance of aircraft. The group supply section also supports the squadrons with aircraft spares. The class II and IX(A) equipment and supplies of the headquarters and maintenance squadron of the fighter/attack group are considerably more bulky than those of the tactical squadrons, totaling about 700 short tons. The figure includes the supply of aircraft spare parts and consumable items carried by the group supply section. The normal supply allowances for aircraft squadrons, authorized by the Naval Air Systems Command, are based upon requirements for 90 days of operations under combat conditions. The group supply section carries these supplies for all squadrons assigned to the group.

f. Air Support and Air Control Squadrons.--In the event a Marine air support or air control squadron is deployed independently from normal wing maintenance and supply support, Marine Corps furnished electronics material and equipment allowances are specifically designed to support the deployment. Normally, if the independent operation involves proximity or attachment to Marine division elements, force service support group will provide direct logistic and maintenance support.

3503. ENGINEERING REQUIREMENTS

The Marine aircraft wing is largely dependent upon engineer support by other forces for base construction, repair, and development. This support is normally supplied in amphibious operations by force engineers and/or naval mobile construction battalions (MCB's). Each type unit of the wing represents a different engineering problem with respect to base requirements. The following paragraphs describe engineering requirements for various types of aviation facilities and the wing engineer capabilities:

a. Airfields for High Performance Aircraft.--Normally, it takes from 5 to 7 days to establish high performance aircraft units on existing airfields within the objective area. The arresting gear installation, the shore-based catapult, and operational aircraft takeoff characteristics diminish the construction requirements to prepare airfields to jet aircraft operation. Fields which are otherwise too short or are partially damaged can be made usable by this method. Taxiways, undamaged parts of runways, or even flat stretches of good highway can serve as a temporary field for high performance aircraft. When fields must be constructed, the shortened runway reduces engineer effort by about two-thirds. In order to establish and rapidly develop air facilities for high performance aircraft, logistic planning includes the necessary preparatory measures to be accomplished concurrently with the conduct of air operations aboard carriers and/or remote airfields. A systematic plan for installation, occupation, and development of air facilities ashore is necessary if a reasonable time schedule is to be attained. Modern jet aircraft require runway surfaces which withstand landing loads of 400 psi and which are 8,000 to 10,000 feet in length to provide for rollout after landing. Runways for modern military jet aircraft must be constructed of reinforced concrete or aluminum matting. Pierced steel planking as used in the past will neither withstand the wheel loads nor the blast from the jet engines. V/STOL aircraft basing flexibility offers significant advantages over those factors listed above. See section VII for an explanation of these advantages.

b. Wing Engineer Organization

(1) The wing engineer squadron, Marine wing support group, Marine aircraft wing, FMF is the primary organization which provides the integral engineer support requirements of the Marine aircraft wing. The squadron consists of a headquarters section, engineer section, utilities section, and a tactical airfield fuel dispensing system section. The headquarters section consists of a command, control, and administrative element necessary to support, coordinate, and supervise the operations of the squadron. The engineer sections consist of a headquarters unit, a support unit, and engineer units to provide the essential engineer construction support of the MAW and assigned units. The full strength number of engineer units within the engineer section table of organization (T/O) is six, but may be adjusted dependent upon the task organization of the MAW to which assigned. One engineer unit is provided for support of each tactical Marine aircraft group with an additional unit assigned to provide engineer support for wing support/headquarters units and air control groups. Accordingly, the engineer unit is the basic engineer support unit of the engineer squadron and is, therefore, the nucleus for structuring the engineer support organization of the wing. The engineer unit, with appropriate augmentation from the headquarters engineer section and other sections of the squadron is capable of being task organized to support deployed MAG's. Depending upon the deployment distance and duration, the engineer unit may be retained in general support or assigned to direct support of the MAG. The utilities section consists of a headquarters unit, three mobile electric power units, and three environmental control units and provides the essential water, hygiene (bath, laundry, decontamination, and fumigation facilities), electric power, refrigeration equipment, and personnel in support of MAW operations. The utilities section is organized, but not limited to, supporting MAW operations from three primary locations. In those instances in which centralized control by the engineer squadron is not practical, elements of the utilities section will augment the engineer unit supporting the wing unit/group operations. The tactical airfield fuel dispensing system section consists of a headquarters unit and TAFDS unit to provide expentionary class III and class III(A) storage and dispensing support for wing units at tactical airfields. The number of TAFDS units within the TAFDS section, normally five, is dependent upon the task organization of the MAW to which assigned. One TAFDS unit is provided for each aircraft group. The number of TAFDS units within an individual MWSG may be adjusted, dependent on the task organization of the MAW to which assigned. In those instances in which centralized control by the engineer squadron is not practical, elements of the TAFDS section will augment the engineer unit supporting the wing unit/group operations to meet the class III/III(A) requirements.

(2) In accomplishing the mission of increasing the combat effectiveness of the Marine aircraft wing by providing direct engineer support to the MAW. This includes the construction, improvement, and maintenance of helicopter and light reconnaissance aircraft landing sites, TAFDS support, and the provision of essential utilities (potable water, bath, and laundry facilities) and electrical power. The squadron is task organized to provide one engineer unit for the MAW headquarters elements and ground control group and for augmentation/contingency purposes, respectively. Operations of those units supporting deployed elements of the MAW will generally be decentralized. Engineer support requirements to the rear of forward/deployed elements will be performed under the centralized control of the engineer

squadron. The primary source of engineer support augmentation in the form of personnel and specialized engineer equipment is provided from the internal resources of the squadron; i.e., the support unit of the engineer section, the utilities section, and the TAFDS section. External augmentation may be provided by the engineer battalion, FSSG or naval construction forces (mobile construction battalion) to meet specific engineer requirements that exceed the capabilities or resources of the engineer squadron.

(3) The organization and equipment of the engineer squadron is based upon the following criteria:

(a) The consolidation of numerous small elements organic to the MAW that previously provided engineer type support into a functionally organized squadron with enhanced capability and the subsequent elimination of decentralized engineer assets.

(b) The construction and equipment support requirements normally will be limited to essentials, expedient in nature and designed to minimum standards to meet tactical aircraft requirements.

(c) The requirement to provide utilities support in the area of mobile electric power, and water and hygiene support in the area of potable water, bath, and laundry facilities.

(4) The following specific functions are considered to be both a responsibility and a capability of the engineer squadron:

(a) Provide engineer reconnaissance/survey within the landing force zone of action.

(b) Repair, improve, and maintain existing road nets within the MAW/MAG's area of responsibility.

(c) Construct and maintain expedient roads.

(d) Construct, improve, and maintain helicopter and light reconnaissance aircraft landing sites to meet minimum wing requirements.

(e) Provide first echelon level maintenance of all organic equipment.

(f) Construct temporary camps to include the provision of technical and equipment assistance for the erection of shelters.

(g) Provide essential utilities support in the area of electrical power.

(h) Provide essential water and hygiene support in the area of potable water, bath, and laundry facilities.

(i) Repair existing warehouses and facilities.

(j) Develop, improve, and maintain drainage systems.

(k) Provide survey and drafting support as required.

(l) Supervise special camouflage tasks.

(m) Provide expeditionary class III/III(A) storage and dispensing support.

(n) Locate quarries, sand and gravel pits, and other sources of construction material in the objective area.

(o) Construct turnouts and parking areas.

(p) Provide expedient repair of existing airfield runways/ taxiways.

(q) Provide minor repair and maintenance within organizational capability to airfield runways and taxiways.

3504. EXPEDITIONARY FACILITIES

As Marine aviation evolved into all jet tactical air units during the 1950's it became apparent to the planners that many of the airfields throughout the world which had been counted on in our contingency planning would not be adequate for fixed-wing jet aircraft. These significantly heavier and faster aircraft required stronger and longer runways than their propeller driven forerunners. Such runways are not common to many of our potential engagement areas. Planners additionally recognized that even where a airfield was available, a second or alternate airstrip would often be needed in a combat environment. Aircraft carriers constituted one answer, provided that a carrier would be readily available whenever an FMF employment situation occurred. Weighing carrier assets against existing and potential demands, the planners decided that the Marine Corps could not rely solely upon carrier decks. The time needed to construct a normal airfield (6 to 8 months minimum) ruled out that alternative. A requirement existed to bypass normal airfield construction methods of grading and pouring an 8,000-foot runway. It was decided to develop a prefabricated and fully portable airfield which could be transported to any given "hot spot" and quickly assembled to launch and recover any of our high performance jets. The development which followed resulted in the expeditionary airfield concept (formerly SATS concept).

a. Expeditionary Airfield Concept.--The EAF is a shore-based weapons support system which permits the employment of landing force aircraft within effective range of ground forces. It has the ability to launch and recover helicopters, V/STOL, and high performance tactical jet aircraft while supporting and maintaining up to one task-organized Marine VF/VA aircraft group, or a mixture of fixed- and rotary-wing aircraft under all-weather conditions. The EAF building block concept starts with the 72-foot by 72-foot expeditionary operating sites, progresses to the 72-foot by 600-foot expeditionary facilities to accommodate VTOL/V/STOL operations, then to the 72-foot by 1,800-foot expeditionary airbase to accommodate up to 36 helicopter and V/STOL aircraft. One expeditionary airfield, 96 feet x 5,184 feet, per aircraft wing will accommodate approximately 88 fixed-wing aircraft or a mix of helicopter/V/STOL and fixed-wing. Lastly, the concept envisions prepositioned war reserve assets for one strategic expeditionary landing field (SELF), 96 feet by 8,000 feet, with parking and taxiways to accommodate the same aircraft as the expeditionary airfield plus military airlift and/or the civilian reserve air fleet. Expansion of the EAF concept from the forward operating sites through the various building block configurations will be dictated by operational requirements, site conditions, and the availability of existing airfields in the theater of operations.

Each of the configurations would consist of AM-2 aluminum matting runway/pad and taxiways plus aluminum matting parking/hides. The concept packages also contain lighting, arresting gear, and other equipment/components to provide for all-weather operations as the conditions dictate. Many factors will influence the time and effort required to install an EAF or other aviation facility, such as site characteristics, number and type of aircraft to be supported, projected duration of operations, availability of local materials, and weather conditions. Figure 23 shows a possible EAF configuration.

b. Expeditionary Airfield (96 Feet by 5,184 Feet).--The EAF is the primary fixed-wing facility in the expeditionary airfield building block concept. Expeditionary airfield assets are not sufficient to support Marine aviation ashore if all major units are deployed simultaneously. Thus, it is envisioned that EAF facilities will be utilized for the initial move ashore and will be augmented by the use of permanent airfields uncovered as operations progress inland.

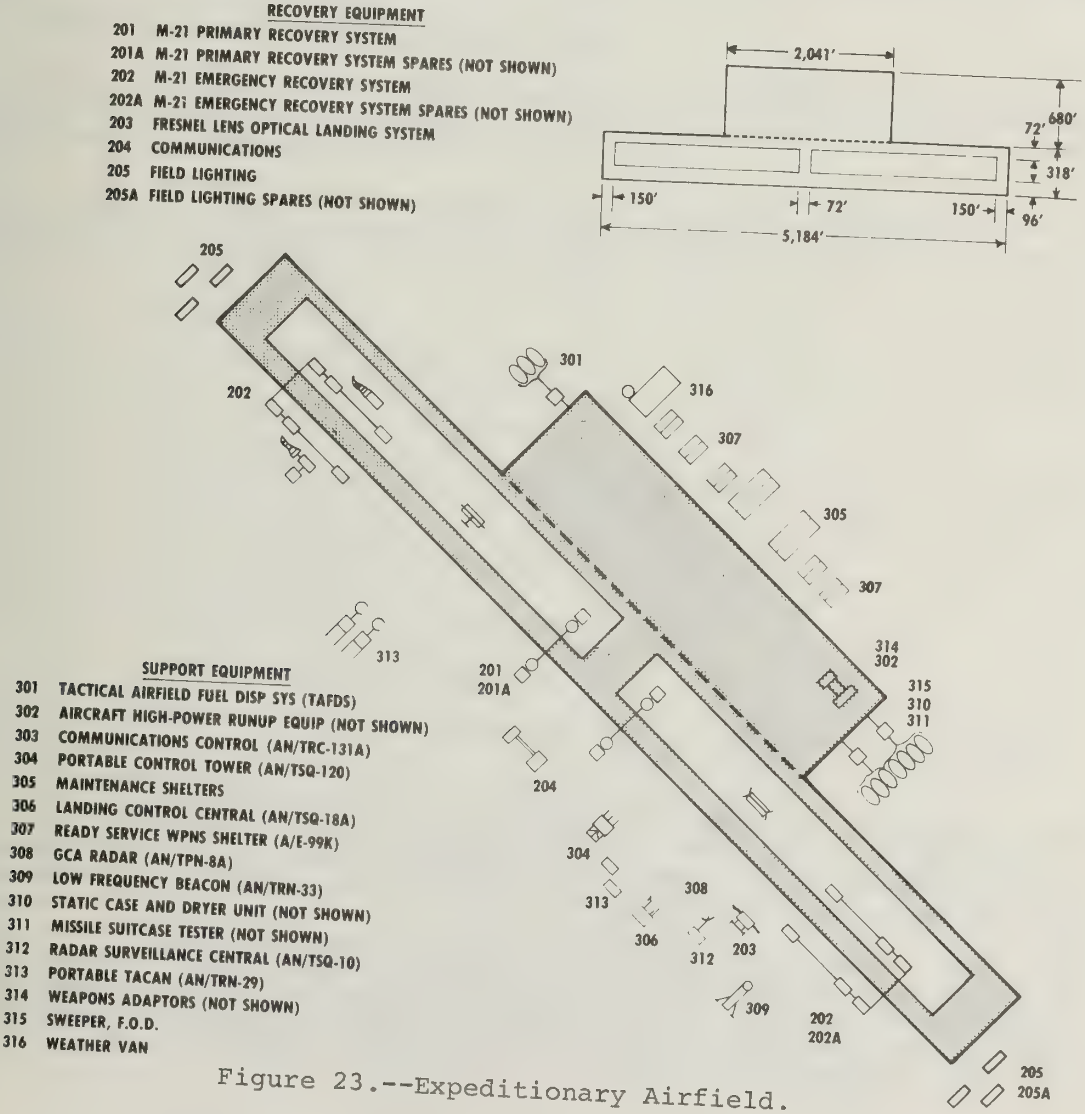

RECOVERY EQUIPMENT
201 M-21 PRIMARY RECOVERY SYSTEM
201A M-21 PRIMARY RECOVERY SYSTEM SPARES (NOT SHOWN)
202 M-21 EMERGENCY RECOVERY SYSTEM
202A M-21 EMERGENCY RECOVERY SYSTEM SPARES (NOT SHOWN)
203 FRESNEL LENS OPTICAL LANDING SYSTEM
204 COMMUNICATIONS
205 FIELD LIGHTING
205A FIELD LIGHTING SPARES (NOT SHOWN)
2,041′
680′
72′
318′
150′
72′
150′
96′
5,184′
205
202
301
316
307
305
307
313
201
201A
314
302
315
310
311
204
304
313
306
308
312
203
309
202
202A
205
205A
SUPPORT EQUIPMENT
301 TACTICAL AIRFIELD FUEL DISP SYS (TAFDS)
302 AIRCRAFT HIGH-POWER RUNUP EQUIP (NOT SHOWN)
303 COMMUNICATIONS CONTROL (AN/TRC-131A)
304 PORTABLE CONTROL TOWER (AN/TSQ-120)
305 MAINTENANCE SHELTERS
306 LANDING CONTROL CENTRAL (AN/TSQ-18A)
307 READY SERVICE WPNS SHELTER (A/E-99K)
308 GCA RADAR (AN/TPN-8A)
309 LOW FREQUENCY BEACON (AN/TRN-33)
310 STATIC CASE AND DRYER UNIT (NOT SHOWN)
311 MISSILE SUITCASE TESTER (NOT SHOWN)
312 RADAR SURVEILLANCE CENTRAL (AN/TSQ-10)
313 PORTABLE TACAN (AN/TRN-29)
314 WEAPONS ADAPTORS (NOT SHOWN)
315 SWEEPER, F.O.D.
316 WEATHER VAN

Figure 23.--Expeditionary Airfield.

c. For further information concerning the EAF and related equipment, refer to FMFM 5-1, Marine Aviation.

d. V/STOL Basing.--(See sec. VII, this chapter.)

Section VI. SPECIAL OPERATIONS

3601. GENERAL

Although Marine aviation is normally an element of an ATF, its capabilities allow employment not necessarily associated with an amphibious assault. Operations other than amphibious assaults are raids, demonsrations, and withdrawals. In addition, specialized operations, such as counterinsurgency and noncombatant evacuation are within the support capabilities of Marine aviation. In the past decade, Marine aviation has been involved in all of the operations mentioned and could be called upon again to perform a mission similar to these. It is, therefore, essential that continuous planning be in progress, to include not only amphibious operations, but all missions that are within the capability of Marine aviation. For additional information on air support in unusual environments, consult FMFM 8-1, Special Operations.

3602. OTHER TYPES OF AMPHIBIOUS OPERATIONS

Raids, demonstrations, withdrawals, and other such amphibious operations normally include both ground and air elements and may or may not be associated with an amphibious assault.

a. Amphibious Raids.--An amphibious raid is a landing from the sea on a hostile shore involving swift incursion into, or temporary occupancy of, an objective followed by a planned withdrawal.

(1) Purposes

(a) To destroy targets.

(b) To harass the enemy.

(c) To attack the enemy rear or flank in support of other forces.

(d) To obtain information.

(e) To create a diversion.

(f) To evacuate personnel.

(g) To establish, support, or coordinate unconventional warfare activities.

(2) Planning.--The plan of attack is similar to the amphibious assault; i.e., scheme of maneuver, landing plan, and plan of supporting fires, except that the scheme of maneuver must provide for withdrawal and reembarkation. See chapter 4 for additional planning considerations.

(3) Scheme of Maneuver.--In developing the scheme of maneuver, the selection of landing zones is of particular importance. The zones selected should permit easy access to the objective; however, if surprise is of paramount importance, a less suitable beach or landing zone may be chosen. Once the operation begins, the predesignated withdrawal point is

not changed unless it becomes absolutely necessary, since change at any time during the raid is confusing and could result in disaster. While a raiding force will usually reembark at the beach or landing zone at which it landed, circumstances may dictate that a different point may be designated. Landings or withdrawals may be conducted by water, air, or a combination of both.

(4) Ship-to-Shore Movement.--Landings may be during daylight or at night.

(a) Daylight.--Enemy situation permitting, movement ashore should be from as close in as possible to allow a short run to the landing beaches or zones. On the other hand, if surprise is essential, it may be that the ships will not be operated close to the shore. As always, the situation should dictate the plan of action. If supporting fires are used, the ship-to-shore movement is similar to that for a major amphibious assault.

(b) Night or Reduced Visibility.--Since a landing at night or under conditions of reduced visibility is conducted to gain surprise, preparatory fires, including airstrikes, are rarely used. Other techniques for gaining surprise are communication restrictions, late deployment of landing craft, and alternate plans for changing landing zones in the event of discovery. Consideration is also given to the possibility of landing pre-H-hour personnel in rubber boats, or single helicopters to seize immediate objectives and to cover the remainder of troops landing in other landing craft or helicopters.

(5) Offensive Air Support.--If offensive air support is desirable and feasible, it is planned in great detail. Because it may compromise the mission, offensive air is seldom employed during small sneak raids. Should the commander decide that it is needed, it may be employed as fully as in an amphibious assault. The commander landing force determines the extent to which offensive air support is necessary. To achieve surprise, he may withhold fires until after the initial landing and the objective is attacked; or he may use an airstrike to provide a shock effect, diversion, or landing zone preparation. If the objective is an offshore island, airstrikes will very likely be directed at harbors, airfields, or embarkation areas from which enemy surface or air attacks may be launched against the raiding force. The tactical air commander should anticipate a requirement for a mixture of aircraft and ordnance, airborne or ground alerts, and a minimum to significant enemy antiair threat. In any event, the commander landing force will probably use extensive air support during the withdrawal and reembarkation. The effectiveness of the supporting fires during withdrawal could very well determine whether the mission is a success or disaster.

b. Amphibious Demonstrations.--An amphibious demonstration is a show of force designed to deceive the enemy, thereby encouraging him to action or inaction which will assist the landing force. The demonstration is a feint at landing involving an approach to a beach or landing zone(s).

(1) Purpose.--To deceive the enemy concerning the time, place, or strength of the main attack, and it normally includes preparatory and supporting fires.

(2) Characteristics

(a) It does not involve the commitment of a landing force ashore.

(b) Although an actual landing of troops is not made, substantial naval and air power is employed.

(c) The forces used in the demonstration are an important consideration in the overall planning of the amphibious assault.

1 The helicopters and fixed-wing assets of an MAGTF would not normally be used in a demonstration. If they are employed for a demonstration, they would not be available for the main attack.

2 Aircraft involved in a demonstration may be part of an advanced force, and not affect the aviation element of an MAGTF.

(d) A demonstration is directed at causing the enemy to misuse his resources, thus weakening his response to the main landing. Sufficient flexibility, however, must exist in the execution of the main landing to exploit unexpected successes achieved as a result of the demonstration, planning must include provisions for them to take full advantage of any targets uncovered, opportunities to attain air superiority, or any advantage which may result from confusion on the part of the enemy.

c. Amphibious Withdrawals.--An amphibious withdrawal is a withdrawal of forces by sea in naval ships or craft from a hostile shore to preclude their loss or for their employment elsewhere.

(1) Mission.--The mission of offensive air support during an amphibious withdrawal is to provide supporting fires as a part of the covering force. This may include naval gunfire spotting, close air support, interdiction, and helicopter escort. Forward air controllers from the TACP's may control airstrikes. In the final stages of the withdrawal, this function would be performed by an AFAC or NAO. The requirement for air support increases as the withdrawing force becomes less and less capable of repelling the enemy. In essence, the supporting fires perform the same tasks as they do when covering the withdrawal phase of an amphibious raid. Once again, they are of crucial importance during retrograde movements.

(2) Operational Considerations.--Offensive air support can effectively support ground retrograde operations whether they be withdrawals or delaying actions. During retrograde operations, the inherent problems and operational characteristics of air support of both offensive and defensive action are combined.

(a) Identification of ground forces from the air is difficult during a period of withdrawal. Ground forces must place emphasis on the marking of positions, installations, and vehicles to ensure their identification by supporting aircraft and preclude their being attacked.

(b) Greater care must be exercised in the positive control of aircraft in direct support of ground elements. The relocation and immediate dissemination of a new FSCL is necessary to ensure the maximum protection of troop safety and coordination of air and ground operations while allowing air maximum freedom in attacking pursuing columns.

(c) Air support can assist in breaking contact with enemy units and providing additional time for landing force elements to withdraw. Armed reconnaissance missions are very effective in this type of operation, particularly when the enemy is pressing the ground units in an attempt to maintain contact.

1 Air fire support to the landing force tends to relieve the pressure on withdrawing elements.

2 These attacks force the enemy to deploy his forces; deny him free access to routes of communications; and disrupt his own fire support, combat, and combat service support elements.

3603. ENVIRONMENTAL FACTORS

Because the MAGTF must be ready to deploy anywhere at any time, it must be prepared to operate in a variety of climates, environments, and weather conditions. Any environment with excessively low or high temperatures presents unique problems for Marine aviation. Commanders must be prepared for these problems and consider them carefully during the planning process. For a detailed discussion of various landing force special operations, refer to FMFM 8-1, Special Operations, and other appropriate manuals of the FMFM series. This paragraph discusses the execution of tactical air operations in four special environments; i.e., desert, jungle, mountain, and cold weather.

a. Offensive Air Support of Desert Operations.--Offensive air operations are especially effective in the desert. In an area where mobile forces with armor are the backbone of ground operations, the extreme effectiveness of aerial munitions, coupled with the range and maneuverability of aircraft and the lack of cover and concealment for ground forces, makes air superiority a must. The excellent flying weather normally present in the desert is favorable to air operations. However, low aircraft availability caused by the effects of sand and the extreme heat can reduce flight operations.

(1) Support of Mobile Forces.--Tactical air operations in the desert are most effective in support of mobile forces. Such forces have great speed and mobility. They require flank protection, long-range reconnaissance, column cover, and route reconnaissance. Such missions can be best performed by tactical aircraft.

(2) Air Missions.--The two general types of air support missions are assigned to air units in support of forces operating in the desert.

(a) Deep Air Support Missions.--Deep air support missions (search and attack or armed reconnaissance) are conducted some distance in advance of the attacking ground forces. Aircraft assigned such missions can do much in clearing the way for the attacking force and can provide considerable information as to indications of the enemy's capabilities.

(b) Close Air Support Missions.--Close air support missions may be utilized to provide flank security in the immediate area of the force and/or to protect the force from attacks.

(3) Operational Problems.--The characteristics of desert areas create significant operational and maintenance problems for aircraft.

(a) Dust and sand infiltrate working mechanisms. They may cause the failure of the mechanism or reduce the service life of the equipment. Consequently, greater emphasis is placed on normal maintenance of aircraft. Requirements for spare parts generally increase.

(b) Fuel and lubricants are much more liable to contamination from dust and sand in the desert. Ground handling equipment is likewise affected by sand and dust. Additional equipment and spare parts must be available; i.e., fuel filters, strainers, etc.

(c) Protective shelters and covers for aircraft and equipment may become mandatory for protection from the sun's heat and sand and dust storms. Personnel working on aircraft must also have this protection.

(d) Blowing dust and sand adversely affect visibility and operations over the battle areas. This is particularly true in battles between mobile forces and battles in which armor, artillery, and heavy weapons are used. This factor has a tremendous effect on ground observation and hinders air observation to some extent. Normally, vertical visibility is better than horizontal visibility and enemy activity can be best observed from the air.

(e) Control of aircraft and air units in a desert operation is difficult. Blowing dust from action of the wind and from the takeoff or landing of aircraft can completely obscure aircraft from visual observation necessary for control. Suitable ground control approach systems must be installed for continuous operations.

(f) At each airfield, target designation and description for air attack in desert areas are difficult due to the sameness of terrain and lack of outstanding landmarks. Maximum use is made of various methods of marking targets and of directing aircraft onto targets.

(g) Recognition is also difficult in desert areas. Friendly tanks and vehicles covered with dust are difficult to distinguish from enemy vehicles. Appropriate means of identification must be employed.

(h) Visual navigation is difficult in desert areas and electronics aids must be provided for air units.

b. Jungle Operations.--In wooded areas and jungles, observation and surveillance are greatly reduced and ground mobility generally slowed. While tactical principles basically remain the same, there are certain factors which directly affect the manner in which air support of ground units can be applied. The difficulties of terrain, climate, and visibility complicate the vital problems of both ground and aviation commanders in locating and establishing operating sites, delivering effective fire support (air, naval gunfire, and artillery), and providing adequate logistic support for the ground and aviation components. Normal procedures are modified to a degree and certain specialized equipment is often necessary to ensure effective air support. Individual training for jungle operations includes thorough indoctrination in survival techniques as well as jungle living, personal hygiene, and care of equipment. Close coordination between air and ground units is mandatory. The employment of techniques to improve fighter/attack unit's air support capabilities, such as electronics devices and air support radar teams, is normally a requirement. The movement of aviation elements supporting ground units (FAC parties, TACP's, ASRT's, DASC, TADC/TACC) and their equipment is greatly restricted in this type of operation. Roads must be constructed for movement of supplies and bulk fuel. The Marine air control elements and the aviation units which establish them require augmentation and assistance in order to displace and reestablish the necessary facilities rapidly in jungle areas.

c. Mountain Operations.--All air units can operate in mountainous terrain; however, special tactics and techniques may be necessary because of the problems imposed by terrain and weather. Mountainous terrain affords cover and concealment to the enemy and limits the altitude and direction from which airstrikes can be conducted. Close air support in a mountainous area presents many safety hazards to attack pilots. Low clouds frequently obstruct the target or friendly positions and "box canyons" inhibit maneuverability over point targets. Terminal control agencies (FAC's and AFAC's) should be aware of the effect that mountainous terrain has on ordnance delivery. The direction of attack is critical. A delivery run downslope requires a near perfect release because any hit beyond the target (12 o'clock) will be magnified in error. Conversely, a run upslope reduces this error. If conditions permit, a delivery run should be directed upslope or across slope; however, care must be taken to ensure sufficient space is available for the aircraft to safely recover after ordnance release. Targets located on top of ridgelines require pinpoint accuracy if the delivery run is made perpendicular to the direction of the ridgeline. A bomb that overshoots the target by a few feet may continue into space impacting harmlessly in the valley below. Delivery runs parallel to ridgelines, although not always practical, provide the greatest degree of safety and probability to destroy the target.

(1) Movement of Aviation Support Units.--The movement of aviation elements and their equipment is generally restricted to roads and improved trails. Both ground and aviation units employ helicopters extensively to assist their mobility in mountainous areas.

(2) Observation and Air Control Site Selection.--Direct observation by airborne observers is the most reliable means of target location in mountainous terrain. Unless forward air controllers, artillery forward observers, and naval gunfire spotters are occupying extremely high terrain, their observation is normally limited to the next hill mass. Airborne observers, as well as airborne forward air controllers, search defiladed areas masked from the ground positions, locate targets, and assist aircraft to conduct more effective air support for ground elements. Communication and radar equipment should be positioned by air control elements (FAC parties, ASRT's, DASC, TADC) to provide the greatest range capability and to assist aircraft in locating and attacking enemy ground targets without being observed by enemy ground forces.

d. Cold Weather Operations.--Aviation units operating under conditions of extreme cold are primarily faced with the problems of survival and mobility. Survival requires provisions for shelter, heat, proper flight clothing, and emergency equipment. Ground mobility is restricted for extended periods. During warmer months, mobility is restricted by thawing ground and the resulting mud and swollen rivers and streams. Heavy winter snow, extreme cold, and reduced visibility adversely affect mobility. When the ground is frozen and snow cover does not exist, there is difficulty in providing adequate protection to personnel and equipment from enemy nuclear and nonnuclear fires due to the difficulty of digging in and/or lack of other protecting installations. Special training and equipment are necessary and should be provided well in advance of the operation so that training can be conducted under conditions similar to those anticipated in the objective area. Winterization of all items of equipment and installation of modification kits must be performed prior to arrival in extremely cold areas.

(1) Flight Operations.--Adverse weather restricts air operations in any area. In arctic areas, it is especially necessary to be familiar with conditions which may affect flight operations. A thorough knowledge of the following conditions, coupled with observance of proper precautions, helps to reduce much of the dangers of operations in the arctic areas:

(a) Engine and airframe icing are extremely hazardous in cold weather operations. The decrease in lift capability because of a very thin layer of ice (e.g., frost) on the wings can prevent an aircraft from getting airborne or maintaining safe flight.

(b) Storms are violent and likely to occur with little warning.

(c) Extensive fog and low overcast are natural products of polar areas and restrict flight operations because of poor visibility. Dry surface snow raised by high winds tends to obscure the ground and the horizon, making visibility poor and obliterating all references to the surface and sky.

(d) Cold weather operations require more careful inspection of aircraft, rigid adherence to prescribed procedures, and more frequent servicing than is necessary in operations under moderate climatic conditions.

(e) Closer attention to detail in aircraft operations is necessary, not only because of the greater strain placed upon the aircraft by low temperatures, but also to reduce mechanical or material failure in flight. Low temperatures increase the difficulty of performing routine mechanical tasks and the time required to complete them.

(f) The use of external power units, engine heating and starting apparatus, wing and engine covers, ice retardants, and other materials is necessary to protect aircraft on the ground and to facilitate having them ready for flight.

(2) Effects on Ordnance.--During extremely cold periods when temperature changes are sudden, ballistics of weapons and ammunition are affected. Point detonating ammunition is normally ineffective in deep snow, since up to 90 percent of the fragmentation is absorbed by the snow cover. To counteract this condition, an airburst using a variable time (VT) or other height setting fuze, is employed. The fuction of VT fuzes is adversely affected by conditions of extreme cold; nevertheless, it is one of the most effective fuzes for arctic operations. Deep snow often has an adverse effect on a chemical bomb by smothering the weapon before it can become effective. White phosphorous (WP) munitions can produce the desired amount of smoke, but the phosphorous particles buried in the snow constitute a hazard to advancing friendly troops for several days.

(3) Movement of Aviation Support Units.--In general, the movement of aviation ground support and air control elements is best performed during the freeze-up period and the first part of winter prior to the arrival of heavy snows. Future displacements are difficult.

(4) Selection and Preparation of Air Facilities Sites.--Sites for landing fields, expeditionary airfields, and other air facilities are selected for their logistic and tactical utility and for protection from

the elements. Supply considerations, especially those of the aviation fuel and munitions, influence the selection of sites. Prior to occupation of a selected site, adequate billeting and working areas, roads, and snow parapets should be prepared. Emphasis on improving the site and providing effective service and operating areas, maximum protection for personnel and equipment, and improving airfield and communication facilities are major factors in development of the area. Shelters for operations and personnel are erected from the materials on hand. Prefabricated buildings greatly simplify the engineer problems and shorten the time required to build adequate shelters. If maintenance personnel are exposed to the elements in servicing and/or repairing aircraft, shelters near the work areas are necessary. Individuals cannot be expected to perform even routine tasks in extreme cold. Camouflage discipline is important, since objects can be quickly spotted in the snow by enemy airborne observers. Equipment painted with white paint and outer garments made of or covered by white cloth can provide winter camouflage. Vehicle tracks normally remain until the next heavy snow or thaw; therefore, movement is restricted to designated trails and roads to prevent compromising positions by visible vehicle tracks.

(5) Observation in Arctic Operations.--Visibility from the air or ground is generally excellent in dry cold and poor in wet cold climates. Movement in snow is very easy to see, particularly from aircraft. During the winter months, good observation is generally limited to a few hours each day because of the short periods of daylight. A greater reliance must be placed upon electronic surveillance means. Snow cover reduces depth perception and obscures ground features and landmarks, making it difficult to ascertain accurate target locations. Sun glare on the snow is intense, requiring dark glasses to prevent painful snow blindness to personnel as a result of continued exposure. On days when the hazy atmosphere blends in with the snow covered terrain or when snow showers inhibit good visibility, aircrews are susceptible to spatial disorientation, where it is difficult to determine where the sky ends and the ground begins (no horizon). This condition requires navigating and maneuvering on aircraft instruments which makes close air support extremely difficult or impossible.

3604. COUNTERINSURGENCY

The continuing possibility of insurgent conditions in many areas of the world requires highly responsive forces to meet the contingencies which may occur. Since most countries of the world are accessible from the sea, amphibious forces provide a unique strategic and tactical counterinsurgency capability. The ability to move freely at sea and in the air, the flexibility to apply the precise force needed, and the quick responsiveness of such forces makes an amphibious force well suited to operations directed at preventing or countering insurgent activity.

a. Airstrikes in Support of a Counterinsurgency Operation.--The role of offensive air support in counterinsurgency operations is more restrictive than in a normal amphibious operation. Close air support, deep air support, and helicopter escort are conducted, but the rules of engagement and the nature of guerrilla warfare place several restraints on the MAGTF commander.

(1) Rules of Engagement.--The impact of the rules of engagement can be significant, but none of the rules should be construed to deter the landing force from defending itself against attack. Some restrictions laid down in rules of engagement are:

(a) Restrictions from airstrikes on populated areas or across international or political boundaries.

(b) Restrictions from "hot pursuit" across international or political boundaries.

(c) Requirement to warn civilian populace of airstrikes to the degree possible without compromising success of the mission.

(d) Requirement to coordinate air operations with the host country government.

(e) Requirement to positively identify target (air or ground) as hostile to host government prior to engagement or attack.

(2) Nature of Guerrilla Activities.--The insurgent guerrilla will attack only when it is to his advantage. When not moving to engage, he will fade into the jungle or the civilian population to avoid detection or engagement with a superior force. These tactics make the coordination of offensive air support very difficult. It is difficult to locate the enemy; it is difficult to distinguish friendly from enemy positions when they are in contact; and when the enemy has infiltrated a civilian population center, an airstrike is not desirable. Although offensive air support against guerrilla activity cannot be applied in the same manner in which it is applied during a normal amphibious operation, it may be effective in counterinsurgency operations by:

(a) Using AFAC's and TAC(A)'s to direct close air support or deep air support against enemy positions or facilities.

(b) Using illumination to counter his nighttime activities.

(c) Using ASRT's to harass and interdict enemy positions, supply routes, and lines of communications at night or in periods of adverse weather conditions.

(d) Using ordnance designed to penetrate forest canopy or detonate a few feet above ground to blast away heavy underbrush the guerrilla may use for concealment.

(e) Using nontoxic gases for harassment of suspected enemy positions.

(f) Using airborne and ground alerts to provide quick response to ground commanders' requests for close air support.

b. Offensive Air Support Limitations in Counterinsurgency Operations.--There are some characteristics of guerrilla warfare that limit the use of offensive air support. The rules of engagement place restrictions on this type operation similar to a conventional amphibious operation. In addition, the commander landing force must consider the following:

(1) Suitable landing fields for fixed-wing operations may not be available. The expeditionary landing fields are suitable for fixed-wing, but the logistic requirements dictate a site close to a beach or harbor which may not be available.

(2) Insurgents will frequently use innocent civilians as shields or hostages. This tactic limits the employment of close air support.

(3) The political situation may severely limit the employment of air support. The host country may desire a minimum use of offensive air support.

(4) The fact that most sparsely populated areas are under the control of the insurgents creates a significant problem for escape and evasion. Aircrews are susceptible to being taken prisoner or executed by the enemy. Therefore, an efficient sea-air rescue (SAR) operation must be made available.

(5) Counterinsurgency operations most probably would be employed in underdeveloped countries. Navigational aids would not be available and maps may be outdated and inaccurate.

3605. NONCOMBATANT EVACUATION

Marine aviation has frequently been given the mission of evacuating noncombatant personnel. Both U.S. and foreign citizens have been evacuated from disaster areas; i.e., floods and earthquakes; and from areas threatened by the outbreak of hostilities; i.e., local uprisings, civil war, or invasion from a foreign power. Over the years, Marines have been involved in mercy missions, but the largest operation to date was the evacuation of U.S. and South Vietnamese citizens from Saigon, Republic of South Vietnam in April 1975. Slightly less than 7,000 personnel were evacuated by helicopter to ships off the coast of South Vietnam. Noncombatant evacuations may, therefore, be classified in two categories: evacuation from a disaster area and evacuation from hostile areas. Both operations require extensive planning, precision timing, and considerations not associated with conventional amphibious operations.

a. Employment.--Evacuating personnel from areas threatened by hostilities will normally require an MAGTF. The landing force should be tasked with providing helicopters for transport of troops and noncombatants and helicopter escort; fixed-wing for SEAD air reconnaissance, helicopter escort, and close air support; and ground troops for security of the landing zones. Offensive air support would provide the helicopter escort, SEAD, and close air support. The MAGTF will be an element of an ATF, task organized especially for air evacuation and geared to the number of evacuees and degree of hostilities anticipated.

b. Principal Considerations.--When employing offensive air support in noncombatant evacuation from a hostile area, the following should be considered:

(1) The U.S. Ambassador is the "on scene" commander ashore. He will have authority over the military force involved.

(2) Maps should be available indicating grid coordinates, streets, buildings, and any other landmarks that would assist navigation and communications.

(3) The evacuation may be conducted from within or near an urban or built-up area. This places many restrictions upon the use of close air support.

(4) If the evacuation is opposed, operations during periods of darkness and reduced visibility will minimize damage or losses from AAA, small arms fire, and missiles.

(5) Fixed-wing aircraft should be available for helicopter escort.

(6) Sufficient aircrews should be available to allow for adequate crew test.

(7) Lights, traffic, and fires will make targets and small arms fire difficult to detect.

(8) Planning for adequate command and control should consider:

(a) The use of a common language between all of the armed forces involved.

(b) Coordination among helicopters, fixed-wing aircraft, the on-scene commander ashore, the TACC afloat, HDC, MAGTF commander, and the CATF.

(c) The employment of an airborne DASC for coordination and control of aircraft in the evacuation area.

(9) A noncombatant evacuation from a hostile area will probably receive world-wide attention. The forces involved must be prepared for extensive news coverage, continuous situation reports (SITREPS) to higher authority, and a policy for courteous and timely response to the many inquiries that will originate from outside of the chain of command.

(10) A noncombatant evacuation from a hostile area may develop into a complex, drawn-out, and tense operation. It is highly desirable that commanders utilize their most experienced and responsible personnel whenever possible.

c. Targets and Ordnance

(1) The tactical air commander should anticipate the assignment of targets posing a threat to the evacuation operation. If the evacuation is opposed, offensive air support may be directed toward:

(a) Small arms fire, AAA, and missile batteries threatening helicopter operations.

(b) Artillery, mortar, and heavy weapons positions directing fire toward evacuation sites and helicopter landing zones.

(c) Armored vehicles or columns directing fire toward evacuation sites or helicopter landing zones.

(d) Positions from which offensive air support aircraft are receiving antiaircraft fire.

(e) Positions from which evacuation shipping is receiving threatening or damaging fire.

(2) The TAC should be prepared to have ordnance available to accomplish any of the above tasks.

d. Rules of Engagement.--Noncombatant evacuation operations are politically sensitive and require a very judicious use of force. The decision to direct fire at targets will be the responsibility of the CATF or a higher authority. Aircrews will be under very strict rules of engagement and must receive extensive briefing and intelligence prior to each mission. Command and control must be efficient during all missions.

Section VII. VERTICAL/SHORT TAKEOFF AND LANDING

3701. GENERAL

V/STOL operations are characterized by a high degree of flexibility that has been thoroughly, but not yet completely, explored. This unique capability of V/STOL aircraft should not be viewed in terms of providing a different type of offensive air support. Rather, V/STOL operations add a new dimension to already proven concepts.

3702. DEFINITIONS

a. Phases I, II, and III.--This is a distinct sequence of V/STOL support to the landing force.

b. Sea Base.--A sea base is a ship capable of transporting, stowing, and operating a complement of V/STOL aircraft. These incude the CVA, LPH, and LHA. A sea base will be capable of launching V/STOL aircraft in the short takeoff (STO) mode with full fuel and ordnance load, will have facilities for intermediate maintenance activities (IMA) and organizational maintenance activities (OMA), will be capable of extended day/night and visual flight rules/instrument flight rules operations, and will be used during phases I and II of a V/STOL amphibious operation.

c. Sea Platform.--A sea platform is any ship capable of operating a V/STOL aircraft and providing minimum support, such as an LPD. A sea platform is capable of day, VFR, and VTOL operations only, can provide limited ordnance loading and refueling, and may be used during phases I and II.

d. Main Base.--A main base is a location ashore which can provide all support required for extended operations of V/STOL aircraft, including maintenence, personnel, billeting, command and control, logistics support, and ordnance support. (See fig. 24.) A main base may be as far as 100 miles from the forward edge of the battle area (FEBA) and will be used during phase III.

e. Facility.--A facility is a location ashore which can provide limited support for V/STOL aircraft, including refueling, maintenance, ordnance, personnel facilities, air operations support, and an area for takeoff and landing. It will generally be 40 to 50 miles from the FEBA and will be used during phases II and III. (See fig. 24.)

f. Forward Site.--A forward site is a location ashore which is suitable for takeoff and landing of V/STOL aircraft. A site normally will be austere, located in a secure area (nominal distance is 20 nautical miles from the FEBA), and can consist of AM-2/AM-6 matting, a road, a parking lot, or a grass field. It may be used during phases I, II, and III of a V/STOL amphibious operation. (See fig. 24.)

g. Vertical Takeoff (VTO).--For an AV-8, this maneuver requires a solid surface such as AM-2/AM-6 matting, good concrete, or a ship's deck.

h. Vertical Landing.--This maneuver also requires a solid surface.

MINIMUM REQUIREMENTS	MAIN BASE	FACILITY	FORWARD SITE
Capability	Full support	Turnaround	Land and Launch
Nominal Number of AV-8's	20	6 to 10	1 to 4
Maintenance	IMA, OMA	Limited OMA	None
Ordnance	Storage, Assembly, and Handling	Storage and Handling	None
Fuel	Storage and Refueling	Storage and Refueling	None
Billeting	400 to 500 Personnel	78 to 116 Personnel	None
Landing and Takeoff Surface	1,500 Ft. Strip	600 Ft. Strip	72 Ft. x 72 Ft. or Existing Hard Surface
Landing Aids	All Weather	Day/TACAN Night	Minimum
Access	Road or Beach	Surface or Helicopter	Helicopter

Figure 24.--Base Characteristics.

i. Rolling Vertical Takeoff.--In this maneuver, the aircraft is allowed to roll forward for a short distance (approximately 100 feet) to gain some airspeed prior to takeoff. A rolling vertical takeoff precludes exhaust gas reingestion, possible damage due to foreign objects entering the engine, and possible damage to the landing surface. This significantly reduces the need for the solid, clean surface required for a VTO.

j. Rolling Vertical Landing.--This is a landing performed with approximately 50 knots of forward speed and is utilized for the same reasons as listed above for a rolling vertical takeoff.

k. Short Takeoff.--This is a takeoff performed using a combination of jet engine lift and aerodynamic wing lift. An STO will require from approximately 400 to 1,200 feet of ground roll.

l. Slow Landing.--This is a landing of approximately 80 to 100 knots using a combination of jet engine lift and aerodynamic wing lift.

m. V/STOL.--This refers to an aircraft capable of performing vertical/short takeoffs and landings; for example, the AV-8.

3703. CONCEPT OF BASING

a. General.--Responsiveness, and the timeliness of that response, is a critical factor in evaluating the effectiveness of a supporting arm.

b. Responsiveness.--Several factors determine responsiveness, not the least of which is the number of aircraft on hand. However, when a fixed number of aircraft assets are allocated, responsiveness can be enhanced by:

(1) Availability of Operationally Ready Aircraft.--Present V/STOL aircraft, when properly supported, maintain a percentage of mission capable aircraft comparable to conventional fixed-wing aircraft presently in the inventory. Future V/STOL aricraft can be expected to continue this trend.

(2) High Sortie Rate.--Present V/STOL aircraft have proven that more sorties per aircraft per day can be anticipated from V/STOL aircraft than from conventional aircraft. This is achieved primarily due to high reliability and the shorter mission times appreciated with forward based aircraft.

c. Timeliness.--A supporting arm must be capable of providing firepower in a timely manner. Aircraft overhead are totally useless if the battle has already been decided. Different combat situations may require a varying degree of support response time, but it is an extremely rare occurrence when the using organization can complain of air support being overhead too soon. V/STOL aircraft are capable of significantly improved response times to air support requests, primarily because they may be based much closer to the supported unit than conventional fixed-wing aircraft.

d. Basing Posture.--As the beachhead expands and the battle area moves farther inland, the basing flexibility of V/STOL aircraft allows timely air support to accompany the ground units by adherence to the following concept of operations:

(1) Phase I, Operation From Sea Bases.--V/STOL aircraft will operate from sea bases until the assault elements are ashore and have control over a reasonable beach area. Short takeoff/vertical landing operations are preferred, but vertical takeoff/vertical landing may be necessary to enhance concurrent helicopter operations. Depending upon deck congestion aboard the sea base, consideration should be given to utilizing available sea platforms, particularly since sea platforms could very well be located closer to the beachhead. As the beachhead expands, a forward site may be established ashore to provide further flexibility and dispersal of assets.

(2) Phase II, Initial Operations Ashore.--As soon as practicable, a facility will be established ashore (a forward site may have been expanded to create the facility). The sea base will continue to provide main basing services, but the majority of offensive air support sorties will be flown from the facility. As the need arises, forward sites may be established to ensure basing compatible with rapid reaction operations. If available, sea platforms may continue to be used as desired to achieve optimum flexibility.

(3) Phase III, Fully Operational Ashore.--As the combat situation dictates, it may be desirable to establish all V/STOL operations ashore requiring establishment of a main base. A facility may be expanded to provide main basing, or a captured airfield might be utilized. Concurrently, additional facilities and forward sites normally would be constructed/established, always with a view toward the driving factor in V/STOL basing concepts; i.e., base the aircraft as close to the supported units as is feasible. Ideally, fuel and ordnance would be staged at forward sites close to the FEBA, thereby allowing aircraft to refuel and rearm without returning to the facility or main base. Although this type of effort poses a variety of logistics and personnel problems, it is extremely desirable. Forward site operations provide the most timely offensive air support possible, and if responsiveness is to be maximized, sorties cannot be expended returning to the facility/main base for anything but essential maintenance repairs.

e. Summary.--The flexibility of V/STOL aircraft in a dynamic combat situation is limited only by the imaginative innovations developed by both air and ground units alike. Stereotyping, either because of temerity or failure to communicate, must be avoided.

3704. CONSIDERATIONS FOR THE OFFENSIVE EMPLOYMENT OF V/STOL AIRCRAFT

Generally, the advent of V/STOL aricraft has not given rise to a need for doctrinal changes to the Marine air command and control system. However, the unique flexibility offered by a V/STOL force has surfaced the need for a certain amount of correspondent flexibility in the command and control system.

a. Deep Air Support/Interdiction.--V/STOL aircraft will be capable of performing deep air support and aerial interdiction sorties. The launch point may differ from conventional fixed-wing bases because V/STOL sorties may originate from a variety of locations as previously discussed in paragraph 3703. This flexibility, and the high sortie rate associated with V/STOL aircraft will be invaluable should a particularly lucrative target be discovered which requires immediate response and/or a significant number of extra missions to neutralize or destroy the enemy.

b. Close Air Support.--CAS supplied by V/STOL aircraft will not differ significantly from conventional fixed-wing aircraft except in regard to the following:

(1) V/STOL aircraft may be operating from the decks of amphibious shipping and will be phasing ashore as soon as such a move is tactically and logistically feasible. This may result in a request for air support in a threat environment where enemy air defense systems have not yet sustained significant damage and remain potent.

(2) Forward Basing of V/STOL Aircraft.--Since the tactical air control party is landed concurrently with a battalion or regimental command post and is collocated with the FSCC it is possible that employment of V/STOL aircraft early in the assault could be accomplished by locating a forward site close to the TACP/FSCC's, assuming that the supported unit can provide security. In this situation, the V/STOL aircraft is placed in the optimum location for immediate response to the ground commander's air support needs. The TACC/TADC or DASC, acting upon order of the CATF/CLF, may allocate V/STOL aircraft to forward sites in "direct support" of a ground unit. This unit would be authorized to launch the mission without experiencing even the limited processing delays occasioned by the MACCS. This procedure would not change the existing MACCS, but would shorten reaction time simply by allowing the pilot to complete the RIO procedures prior to the assignment of a specific mission. The V/STOL aircraft is launched by use of the TACP communication nets, and would be directly responsive to the needs of the particular ground commander. The TACC/TADC or DASC, as appropriate, will monitor the request, and by silence will indicate approval. The DASC or TACC/TADC retains the option of diverting the assigned aircraft either before or after launch. This option permits massing of assets, or diversion to more critical missions as are traditionally the capabilities of air control agencies. Generally, the effectiveness of a CAS mission increases as the reaction time decreases. There is, at present, no other method of employment capable of providing air support in as timely a manner.

c. Air Defense Operations

(1) Due to their basing flexibility, V/STOL aircraft are phased ashore early and thereafter will probably be based farther forward than conventional fixed-wing aircraft. Although air defense will normally be provided by fighter aircraft operating from advanced bases or aircraft carriers, the V/STOL concept of employment may require providing self defense from an airborne threat. This is true both of enemy air attacks against V/STOL aircraft engaged in offensive air operations and also of enemy air attacks against facilities, forward sites, or ground loitering aircraft. Indeed, it is conceivable that in small scale amphibious operations, V/STOL aircraft would be the only fixed-wing air support available. In this context, V/STOL attack aircraft are capable of providing limited protection for the supported ground units from enemy offensive air attack.

(2) The impact of performing air defense operations upon the primary mission of offensive air support could manifest itself in two ways. First, the air defense requirement could cause a decrease in the number of sorties available for ground attack, since entire sorties might have to be dedicated to air defense. Alternatively, the ordnance payload available for the ground attack mission may be reduced by the necessity to replace a portion of the air-to-ground ordnance with air-to-air weaponry.

3705. LOGISTICS CONSIDERATION

The management of logistics; i.e., site selection and construction, resupply of fuel and ordnance, aircraft maintenance, etc., offers a challenging opportunity. It is considered beyond the scope of this manual to provide detailed instructions, but the following information will aid the CATF/CLF in planning and executing V/STOL support for an amphibious operation.

LOCATION	EQUIPMENT	MATERIAL	MANPOWER	TIME
AVAILABLE AIRFIELD	NONE	NONE	NONE	NONE
DAMAGED AIRFIELD/ROAD	NONE	NONE	SMALL CREW	NEGLIGIBLE
FLAT OPEN GRASSLAND	NONE	72 x 72 FOOT AM-2 MATTING	16	LESS THAN 8 HOURS
ROUGH OPEN TERRAIN	TRACTOR & ROLLER	72 x 72 FOOT AM-2 MATTING	18	WITHIN 1 DAY
LIGHT FOREST	TRACTORS, GRADERS, & ROLLERS	72 x 72 FOOT AM-2 MATTING	19-25	1 TO 2 DAYS

Figure 25.--Buildup Requirements for Forward Site.

a. Site Selection.--Imagination and ingenuity on the part of the planner must be utilized in the task. The following questions should be considered:

(1) Is the site really necessary? Will the benefit to be gained by timely response from a particular site be worth the effort of activating the site, or will the FEBA have moved beyond range by the time activation is complete?

(2) What is available on the ground? The ideal would be to capture an enemy airfield, but the chances of this are admittedly quite slim in some theaters of operation. Rather, the planners should look for areas that are usable as they stand (e.g., roads) or areas that require minimum work such as that upon terrain. Figures 25 and 26 show appropriate build-up requirements for construction of a minimum forward site.

ITEM	PAD ONLY		PAD AND PARKING AREA	
	1 DAY	2 DAYS	1 DAY	2 DAYS
450 TRACTOR	2	1	4	2
LIGHTWEIGHT ROAD GRADER	2	1	2	1
SHEEPSFOOT ROLLER	1	1	1	1
WOBBLY WHEEL ROLLER	1	1	1	1
MEN	22	19	25	21

Figure 26.--Quantity of Equipment/Personnel for Forward Site Buildup.

	ROUGH OPEN TERRAIN		LIGHT FOREST	
	1 DAY	3 DAYS	1 DAY	3 DAYS
TRACTORS	10	4	14	6
SCRAPERS	4	2	4	2
GRADERS	2	1	2	1
ROLLERS	3	2	3	2
DUMP TRUCKS	6	3	6	3
FORKLIFTS	4	4	4	4
MEN	95	72	87	72

Figure 27.--Quantity of Equipment/Personnel for Facility Buildup.

(3) Will a proposed site be upgraded to a facility/main base? Will it be further upgraded to a conventional aircraft expeditionary airfield? If so, the minimum requirements for the upgraded base must be met in the original site survey. Approximate requirements for upgrading to a facility and main base are shown in figures 27 and 28.

(4) Is the proposed site accessible for resupply if required? For example, 20 AV-8 aircraft flying 80 sorties in 1 day from a main base may consume as much as 322,000 pounds of ordnance and 320,000 pounds of jet fuel. Six AV-8 aircraft flying 24 sorties in a day may require 96,000 pounds of ordnance and 96,000 pounds of fuel.

	FLAT OPEN GRASSLAND		ROUGH OPEN TERRAIN		LIGHT FOREST	
	1 DAY	3 DAYS	1 DAY	3 DAYS	1 DAY	3 DAYS
TRACTORS	7	3	30	11	38	14
SCRAPERS	3	1	12	4	16	6
GRADERS	3	1	5	2	5	2
FORKLIFTS	-	-	4	3	4	3
MEN	78	63	140	87	158	94

Figure 28.--Quantity of Equipment/Personnel for Main Base Buildup.

b. Transportation.--The exact number of vehicle/helicopter sorties to support V/STOL operations will vary with the number of sites supported. Suffice to say, with the extremely flexible basing posture of V/STOL aviation, the amount of transportation support will be slightly greater than for a conventional fixed-wing squadron operationg from a fixed base in the rear areas. This added requirement will be more than compensated for by the rapid response air support available to the ground commander.

c. Aircraft Maintenance.--The requirements of aircraft maintenance will vary with the level of basing of V/STOL aircraft. The only added requirement will be the effort necessary to recover malfunctioning aircraft from forward sites. This occurrence is unlikely, but if it should happen, the response must be rapid and in sufficient force to preclude the unnecessary loss of an aircraft.

3706. SUMMARY

V/STOL aircraft offer a flexibility to Marine offensive air support previously unexperienced. In order to employ V/STOL aircraft so as to derive maximum benefit from their unique capabilities:

a. Ground and air commanders should actively seek new outlets for demonstrating and maximizing V/STOL flexibility. V/STOL operations are an ever-expanding field that must not be allowed to stagnate.

b. The advantage of generating rapid response and high sortie rates carries with it a susceptibility to misuse aviation assets. Offensive air support should be used to augment, and not to replace, organic firepower.

CHAPTER 4

OFFENSIVE AIR SUPPORT PLANNING

Section I. INTRODUCTION

4101. GENERAL

The MAGTF is designed to operate as the landing force or as a component of a larger landing force. To this end, organic Marine aviation within the task force contributes to the execution of the operation as landing force aviation. Specific considerations apply to the offensive air support portions of this aviation element in the planning sequence.

4102. PLANNING GUIDANCE

As soon as practicable after the receipt of the initiating directive, the CATF issues a planning directive to ensure that interdependent plans are coordinated, completed according to the time limitations, and comprehensive in their scope. This directive specifies the principal plans to be prepared and the time allotted for this preparation. Then each successive commander; i.e., landing force, ground, and aviation, prepares a planning program containing his force planning schedule. This planning guidance, at any level, may be either oral or written and is prepared for and given to subordinate commanders and staffs. It also provides the needed information for concurrent, parallel, and detailed planning for the subordinate unit commanders involved, as well as a framework for the necessary studies and estimates. It serves, for instance, as a guide for the preparation of aviation staff estimates. As soon as the CLF provides his initial planning guidance, the MAGTF aviation commander will issue his guidance to aviation subordinates. Such guidance is updated throughout the planning phase by directives, memoranda, outlines, plans, staff conferences, and informal briefings.

4103. PRELIMINARY PLANNING DIRECTIVES

Preliminary planning directives augment the CATF planning guidance and may, in fact, precede the initiating directive. They are based upon alerting notices received by commanders providing forces for the amphibious task force. Although the format of such alerting notices are too varied to be defined, they will be definitive enough to permit an analysis of the area of operations and an assessment of additional intelligence requirements. Study of beaches, ports, communication networks, existing air facilities, and terrain provides an initial basis for determining the number and types of landing force air elements that can be accommodated and supported within possible landing areas.

4104. SEQUENCE OF AIR STAFF PLANNING

The sequence of planning air support, as it affects the landing force, includes the following steps:

a. Receipt of Initiating Directive.--The initiating directive is an order to the CATF, with copies to the landing force and major component commanders, to conduct an amphibious operation. The initiating directive provides for the establishment of an ATF, the assignment of a mission, and the necessary forces to accomplish the mission.

b. Initial Estimate of Landing Force Air Support Requirements.--Aviation planning commences with the preparation of initial estimates of landing force air support requirements to include offensive air operations. These estimates are prepared as soon as initial information of an operation is received by the CLF. At this time, only the broadest estimates can be made. These initial estimates are usually limited to those which tentatively determine the number and type of participating units, the control agencies necessary, and the logistic support required.

c. Initial Planning Conference.--Subsequent to the receipt of the initiating directive, the CATF conducts an initial planning conference. At this stage, the CATF and the CLF jointly render decisions on issues which concern all of the elements of the ATF, both landing force and naval. The initial estimate of landing force air support requirements assists the CLF in reaching the basic decisions at the initial planning conference. Included in the basic decisions are the selection of landing force objectives, the development of the landing force concept of operations ashore, the selection of helicopter landing zones, and the selection of fixed-wing aircraft landing fields and drop zones.

d. Commander Landing Force's Planning Guidance.--Planning guidance is derived from a consideration of the information contained in the initiating directive, the initial planning conference, and other instructions that may be received. This guidance is the commander's input to his staff and subordinate commanders for preparation or revision of their estimates. The commander's guidance may take a wide variety of forms and includes a variety of information, but will normally outline broad and general courses of action which the commander particularly desires to be initiated. Subsequent planning guidance will be provided to all levels throughout the planning process.

e. Aviation Estimate of Supportability.--The aviation estimate of supportability summarizes significant aspects of the situation as they influence any proposed course of action, analyzes the impact of aviation factors upon the particular situations, then evaluates and determines how aviation units can be best employed in support of each contemplated landing force course of action. The aviation estimate is presented verbally or in writing to the CLF by the landing force aviation element commander. This estimate is discussed in detail in section V of this chapter.

f. Commander Landing Force's Estimate.--The CLF selects the most favorable course of action in his estimate and announces it as his decision. The commander's decision provides a firm basis for subsequent development of the operation plan, and appropriately amplified, it becomes the commander's concept of operations ashore.

g. Detailed Estimate of Air Support Requirements.--Detailed planning of landing force air support requirements commences after the CLF issues his concept of operations. The detailed estimate of air support requirements establishes the number and type of aircraft in terms of squadrons that will be needed to support the operation. It also provides information concerning the use of nuclear weapons, enemy targets in the beachhead area, enemy targets remote from the beachhead which may affect the force, air reconnaissance necessary to support the operation, assault support operations in and about the landing area, and the control facilities necessary to support the commander's concept of operation. Attention is given to the time required to locate and prepare facilities and/or sites which will assist the aviation component in the early establishment of aviation units ashore. Special consideration is given to the aviation requirement to conduct AAW operations. A further discussion of this estimate is contained in section VI of this chapter.

h. Aviation Concept.--The final step in the aviation staff planning sequence is the preparation of the aviation concept of operations. Additionally, completion of the aviation element task organization requires inclusion of all aviation support units needed for the tactical units specified in the detailed estimate of air support requirements. Air operation plans and orders may now be prepared.

Section II. BASIC ELEMENTS OF AIR SUPPORT PLANNING

4201. GENERAL

Upon receipt of the ATF and landing force initial planning directives, preliminary air support planning is commenced. Closely allied with the evolution of the basic decisions is the determination of requirements, the allocation of means, and the reconciliation of the means available with the requirements for shipping, landing means, and fire support. In applying the process to air support planning, a general balancing of aviation requirements versus aviation capabilities is normally adequate. The means initially available seldom satisfy stated requirements; therefore, reconciliation of these factors continues throughout the planning cycle. The following paragraphs cover the principal considerations involved in air support planning.

4202. CENTRALIZED CONTROL

In an amphibious operation, a single integrated air control system is developed that is capable of controlling and coordinating all air operations within an assigned area of responsibility. Control of air operations is exercised by various commands as the operation progresses. Plans must be made to provide each of these controlling commanders with the proper facilities for the requisite centralized control. As soon as conditions permit, air control facilities are established ashore that parallel the naval control agencies afloat. The control facilities ashore are initially held in a standby status, monitoring all air control circuits. Upon recommendation of the commander landing force (or appropriate agencies ashore), the CATF may pass control of air operations to CLF or the joint task force commander concerned. The passage of control may be incremental. After passage of any or all control functions ashore, the Navy control centers afloat continue to monitor appropriate circuits, ready to resume active control in the event this becomes necessary. Section III of chapter 5 discusses control in further detail.

4203. ACHIEVEMENT OF LOCAL AIR SUPERIORITY

Success in an amphibious operation requires a distinct margin of air superiority in the area of its operations. Because complete destruction of enemy air strength is rarely attained, all elements of the amphibious task force must be provided with continuing air defense throughout the operation. Air superiority is gained and maintained only through offensive and defensive operations that exploit the capabilities of all participating forces. Both types of operations are essential; neither alone can provide the degree of air superiority needed for the decisive joint application of military power. Planning and execution of this effort must be closely coordinated with all other operations in the objective area to ensure that friendly aircraft have freedom of action and, conversely, that it is denied to the enemy. Attack aircraft may be employed in antiair warfare operations designed to destroy the enemy threat (aircraft, missiles, radar systems, and command and control facilities) on the ground. This employment is considered to be antiair warfare, for the purposes of this manual, and is discussed in FMFM 5-5, Antiair Warfare.

4204. ACCESS TO CONTROL AGENCIES

Plans must ensure that all landing force command levels are provided direct access to the agency exercising control of aircraft allocated to direct air support. Intermediate ground command levels may countermand or modify requests of subordinates for direct air support at the time the requests are made to the air support control agency. The means for providing the access is via the tactical air request net. The following is a summary of participation from the coordinating agency point of view:

a. TACC/TADC.--As the supervisory authority for the MACCS, the TACC/TADC monitors the current status of air operations. This is accomplished by receiving inputs from the DASC and TAOC concerning the specific functional activity for which they are responsible. The TACC/TADC consolidates this information and employs it in supervisory decisions. The TACC/TADC normally controls ground alert CAS aircraft, as well as possessing the authority to divert aircraft from preplanned missions for immediate requirements. Both of these functions may be delegated to the DASC, if the situation allows, and if priorities are clearly defined. The DASC and/or TAOC receive the final mission assessment for the missions conducted and forward this information to appropriate agencies as designated by the tactical air commander.

b. TAOC.--The TAOC participates in the conduct of direct air support primarily by providing aircraft movement control. For aircraft flying longer distances in the objective area, the TAOC provides flight separation data to ensure flight safety. The TAOC coordinates with the DASC on aircraft identification and radar handovers for ASRT's. It controls aircraft initially entering the sector to participate in direct air support missions. Finally, it controls the conduct of air refueling operations assigned in support of direct air support missions. Early warning and control (EW/C) sites function in a manner similar to the functioning of the TAOC, but to a more limited degree.

c. MATCS.--MATCS's participation in the conduct of direct air support missions is threefold. First, it is concerned with the launch of some direct air support aircraft from ground alert status and provides for the aircraft safety associated with a "hot pad" of any type. Second, MATCS requires fire support coordination information from the DASC to provide for the safety of aircraft under its control, either departure/recovery aircraft, or aircraft for which it is providing flight following. The final task performed is providing flight following and positive radar control as required for direct air support missions operating within their control area.

d. DASC.--The DASC is the central coordination agency for direct air support. The DASC receives immediate requests from ground units directly and through the FSCC, if necessary. It receives aircraft by category from the TACC/TADC for commitment to ground unit support. It coordinates with the TAOC for some en route aircraft. Aircraft under its control are passed to terminal control agencies for actual mission execution. It integrates direct air support activity with the senior FSCC and provides designated MAGTF agencies with information on fire support coordination measures, restrictions, and controls. The DASC directs and coordinates the employment of subordinate ASRT's. Finally, the DASC determines routes of approach and retirement for aircraft under its control.

e. TACP.--The TACP is the agency representing ground elements within the direct air support sequence of events. It forwards requests for air and executes control of received air missions. It advises the ground elements on the use, availability, and techniques/requirements to make the most economical use of direct air support missions. It provides the aviation representation in various level FSCC's for fire support coordination purposes.

f. TAC(A)/AFAC/NAO.--The TAC(A)/AFAC/NAO may request and receive aircraft from the DASC for control as instructed by supported ground units, or as prompted by the mission he is assigned. Further, the TAC(A)/AFAC/NAO, in conjunction with with the HC(A), will act as a coordinating controller when fixed-wing and helicopter aircraft are operating in proximity to one another and a ground controller is not available.

g. HC(A).--The HC(A) assists the DASC or HDC in the coordination and control of helicopters. An HC(A) normally is utilized only for the initial assault and works closely with the TAC(A) to ensure coordination of helicopter movement with fixed-wing aircraft employment during combined fixed-wing and helicopter operations.

4205. DEPLOYMENT OF AIR UNITS

Offensive air support units normally will be deployed by air. The aircraft will be ferried by aircrews utilizing aerial tankers as necessary to extend their range. The most likely means of moving support personnel and equipment is via air transport. Deployment may be either directly to the landing area or to airfields in friendly territory adjacent to the landing area.

a. Landing Area.--Plans should provide for early seizure of sites for operating aircraft and air control facilities in order to:

(1) Provide for the early deployment within the objective area of air units designated for continuing support of the landing force.

(2) Extend the radius of warning and control and, thus, improve the task force air defense capabilities.

b. Adjacent Areas.--Plans providing for deployment of aircraft to airfields in friendly territory adjacent to the amphibious operation area must be prepared to:

(1) Facilitate rapid deployment to airfields within the objective area.

(2) Provide for the support which may only be acquired through the use of aerial tankers to extend the range of supporting aircraft.

4206. AIRCRAFT AVAILABILITIES

Initially, air support which is preplanned in detail must be provided by aircraft operating from carriers or bases within effective range of the objective area. As the facilities for operating landbased aircraft are secured within the objective area, aircraft operating from such facilities are employed through the tactical air control system to fulfill an increasing amount of the total air support needs. Plans must assure that the transition into the objective area can be made without interrupting the effectiveness of the air support. Aircraft are phased into the landbased facilities to shorten response time and, therefore, to improve air support effectiveness.

4207. TRANSFER OF AIRSPACE CONTROL

Plans must provide for the orderly transfer of airspace control throughout the amphibious operation. The following subparagraphs outline the transfer sequence which, if employed, must be the subject of detailed planning. More detailed guidance may be found in LFM 04/NWP 17, Doctrine and Procedures for Airspace Control in the Combat Zone.

a. Airspace Control Authority.--The area airspace control authority of the joint force commander exercising control over the combat zone in which the amphibious objective area is located transfers control to the advance force commander of the amphibious task force.

b. Advanced Force Commander.--The advanced force commander transfers airspace control to the commander amphibious task force.

c. Commander Amphibious Task Force.--The commander amphibious task force passes control to the commander landing force or other commander ashore.

d. Commander Landing Force.--Upon the termination of the amphibious operation, the commander landing force transfers control back to the area airspace control authority of the appropriate joint force commander.

Section III. PLANNING RESPONSIBILITIES

4301. GENERAL

Planning in detail ensures the maximum support from the available aircraft, while avoiding unnecessary degradation of the air support capability. Planning, however, is a coordinate responsibility of all concerned. Although specifically defined herein as the responsibility of one command or commander, the parallel and concurrent characteristics of planning common to all amphibious operations are also applicable to air support.

4302. AMPHIBIOUS TASK FORCE

The CATF has the following responsibilities:

a. Determination of Overall Requirements of the Amphibious Task Force.--Naval requirements remain generally constant throughout the operation. Air superiority must be attained and maintained in the objective area, and the movement of enemy forces into and within the objective area must be curtailed or halted. A continuing requirement exists for air defense against enemy air, surface, and subsurface attack.

b. Determination of Air Support Capabilities.--The CATF determines the air support capabilities of the entire task force in terms of sorties, endurance on station, ordnance loads, and payloads.

c. Coordination of All Air Support Tasks.--The CATF coordinates all requests for air support originating within the task force and allocates aircraft in accordance with the ATF assets and capabilities. When the need arises, he makes requests for additional support to higher authority.

d. Preparation of an Air Plan.--The CATF prepares an air plan to govern the employment of aviation throughout the operation. The air plans of subordinate commanders of the amphibious task force must conform to the amphibious task force plan.

4303. LANDING FORCE

The CLF has the following responsibilities:

a. Determination of Landing Force Air Support Requirements.--The CLF coordinates all requests for air support originating within the landing force, and submits the consolidated requirements to the CATF.

b. Determination of Landing Force Air Support Capabilities.--The CLF determines the air support capabilities of the landing force aviation units and submits this information to the CATF.

c. Submission of Plans for Deployment of Aviation Elements Ashore.--The CLF submits recommendations to the CATF for the deployment ashore of landing force and other aviation units.

d. Preparation of an Air Plan.--The CLF prepares an air plan in coordination with the amphibious task force air plan.

4304. LANDING FORCE AVIATION

Landing force aviation planning responsibilities are:

a. Determination of Landing Force Aviation Air Support Requirements.--The landing force aviation commander submits requests for air support to the CLF. These requests are consolidated with those from other landing force elements.

b. Determination of Landing Force Air Support Capabilities.--The landing force aviation commander submits the air support capabilities of landing force aviation units to the CLF.

c. Submission of Plans for Deployment of Aviation Elements Ashore.--The landing force aviation commander submits recommendations to the CLF for the deployment ashore of landing force aviation units.

d. Preparation of an Operation Plan.--The landing force aviation commander prepares an operation plan in coordination with the amphibious task force and landing force air plans.

4305. AVIATION UNITS

Aviation units are responsible for providing input as required by the landing force aviation commander regarding their needs and capabilities. Normally, the planning directive published by the landing force aviation commander will contain the necessary guidance as to the type and timeliness of information required.

a. Needs.--Identified here will be personnel and support equipment shortfalls, training requirements, and other items that the commander deems necessary. In addition, the envisioned employment of the organization will permit the commander to predict his need for work spaces, billeting and messing facilities, security, and those other matters which are affected by the conditions of employment. Here is where climatic considerations will be very much in evidence.

b. Capabilities.--As limitations on the expected capabilities of an organization may be encountered due to the lack of personnel, equipment, and training, it is prudent to establish the capabilities as they exist. Further, the increase in capabilities provided through the acquisition of personnel and equipment, and the accomplishment of training must be delineated to ensure that the landing force aviation commander can adequately determine the readiness of his force.

Section IV. INITIAL ESTIMATES OF LANDING FORCE AIR SUPPORT REQUIREMENTS

4401. GENERAL

The initial estimates of landing force air support requirements is prepared as soon as preliminary information of an operation is received. At this time, only the broadest estimate can be made. This initial estimate may only include the number and type of units selected, the control agencies necessary, and the logistic support required. Some of the air support allocations can be deduced from the aviation capabilities of the force involved, estimations of the enemy air which might be encountered, and the general mission of the landing force.

4402. LANDING FORCE AVIATION TASKS

The landing force aviation commander is tasked with evaluating and submitting an initial estimate of landing force air support requirements. After his evaluation, he will prepare his initial estimate of the numbers and types of units to be employed. In preparing his estimate, he will consider the following:

a. Characteristics of the Area of Operations.--This includes all characteristics which will have an influence on possible courses of action. The factors are divided into two principle classes.

(1) General Factors.--A broad field which includes the impact of political, economic, and psychological conditions upon the conduct of friendly and enemy operations.

(2) Fixed Factors.--Stable characteristics in the area of operations. It is necessary to determine what limitations they impose or what advantages they may offer to the commander's force or those of the enemy. These characteristics include hydrography, terrain and topography, climate and weather, daylight and dark periods, locations and distances, lines of transportation and supply, health and sanitation conditions, usable facilities and fixed defenses, area communication facilities, and missile sites. Pertinent conclusions should be drawn in each case.

b. Relative Combat Power.--This includes an examination and comparison of opposing forces which covers communication and electronics capabilities, logistic support, and time and distance factors.

c. Factors of Environment and Relative Combat Power.--Having surveyed the environment, comparative resources, and his and the enemy's capabilities, the commander will find it useful to review the conclusions reached thus far. He must assess their possible impact by identifying deficiencies in information and sensitive areas of security, tabulating strength and weakness factors, and finally making the initial determination of the adequacy of his own force.

Section V. AVIATION ESTIMATE OF SUPPORTABILITY

4501. GENERAL

Preparation of an aviation estimate of supportability is the second step of the air support planning sequence. It is a special staff estimate prepared by, or under the cognizance of, the landing force tactical air commander. There is no set format for this estimate, and it may be presented verbally or in writing. Its purpose is to summarize significant aviation aspects of the situation as they might influence any course of action proposed, and to evaluate and determine how aviation units can best be employed to support the contemplated land force courses of action. The criteria for preparing and presenting the aviation estimate of supportability is found in FMFM 5-1, Marine Aviation.

Section VI. DETERMINING DETAILED AIR SUPPORT REQUIREMENTS

4601. GENERAL

A detailed estimate of air support requirements is made by the landing force aviation commander after the CLF has issued his concept of operations. It is made to ensure that adequate aviation resources are available for the operation. The CATF may require that landing force aviation participate in some or all of the ATF air support effort. Therefore, the landing force aviation commander may also participate in the determination of the estimate of air support requirements for the ATF. At this point in the planning sequence, the adequacy of air support means is measured to determine if sufficient aviation assets have been assigned to support all requirements. An example of a checklist of air support requirements is depicted in appendix B of FMFM 5-1, Marine Aviation.

a. In order that maximum benefits may be derived from aircraft in offensive air support, certain basic principles must be observed. Offensive air support should be requested when any one of the following factors is present:

(1) Air support is most suited for accomplishing the desired results, and/or other means of support are not available.

(2) Other means of support are incapable of accomplishing the results desired.

(3) The urgency of the situation requires that the fires of all supporting arms be brought to bear.

b. Such principles should be followed with an intelligent appreciation for the tactical situation. Aircraft should not be requested for targets which can be neutralized by other means. When requested air support is available, it should be used as soon as possible, rather than held on station, as it is more efficient to expend the armament, recover the aircraft, rearm, and be prepared to return on call.

4602. GROUND COMBAT ELEMENT OFFENSIVE AIR SUPPORT REQUESTS

Upon receipt of the CLF concept of operations, the ground combat element commander formalizes his air support requests. Close air support target lists are made, and on-call close air support requirements are predicted. When deriving his offensive air support requirements, the commander must consider the possibility of airspace saturation due to conflicting interests of other supporting arms and mutual interference of adjacent air missions. Thus a reasonable limit on the number of aircraft to be requested within a particular time frame must be imposed. Requests must reflect the anticipated threat (i.e., infantry, mechanized forces; artillery in the open, reveted, entrenched) to permit proper ordnance selection by the landing force aviation component.

4603. DETERMINATION OF REQUIREMENTS

a. Contents.--The detailed estimate of air requirements is a document of considerable value for the continuous planning of the amphibious operation. The landing force aviation commander incorporates in it his needs for offensive air support in terms of ordnance, fuel and other POL supplies, control agencies, personnel and equipment for support, and such other concerns as are appropriate. Specifically, the detailed estimate includes the following:

(1) Amount of offensive air support assets required by type (VMA, VMA(AW), VMA(AV-8), VMFA).

(2) Amount of bulk fuel necessary to support the operation.

(3) Amount of ordnance required by type.

(4) Amount of shipping and number of landing craft and amphibious vehicles required by type.

(5) Amount of special equipment required by type, organic and nonorganic.

b. Preparation.--Written estimates of air needs are prepared in a form similar to the estimate of supportability. The format generally follows the sequence of general requirement totals, pre-D-day, D-day, and post-D-day and other miscellaneous requirements affecting aviation.

Section VII. FORMULATION OF AIR PLANS

4701. GENERAL

Air plans reflect the nature of air operations, and centralized control dominates the planning phase. The basic uniformity of practice that promotes effectiveness in the conduct of operations is valuable, but it is not intended to restrict initiative or flexibility that may be necessary to meet the demands of each situation.

4702. AMPHIBIOUS TASK FORCE OPERATION PLAN

a. Development.--The chief distinction between various concepts devoped in the estimate of the situation and the development of the operation plan is that of precision. What is to be done, by whom, and when, is set forth in the amphibious task force plan. This plan should be clear, concise, complete, and authoritative in nature. It must convey positively the CATF's determination and intentions.

b. Format.--The format for the amphibious task force operation plan is found in NWIP 22-1, The Amphibious Task Force Plan. Of particular importance in the preparation of subordinate aviation unit plans are the air operations, antiair warfare, and amphibious operations (for ship-to-shore movement) annexes.

c. Responsibilities.--The CATF will identify the tasks to be performed by landing force aviation in order to:

(1) Attain and maintain air superiority in the objective area.

(2) Curtail or halt the movement of enemy forces into and within the objective area.

(3) Provide air control within the objective area.

(4) Conduct the helicopterborne ship-to-shore movement.

Section VIII. AVIATION COMBAT DOCUMENTS

4801. GENERAL

a. The operations of aviation elements in combat are governed principally by three types of documents: operation plans/orders, fragmentary orders, and standing operating procedures (SOP's).

b. The decentralized control in ground combat operations permits the division commander to issue an operation plan or order directed toward overall objectives. The detailed orders necessary to achieve those objectives will be issued by subordinate commanders. By contrast, the wing in combat does not move or displace toward an objective, rather it is moved ashore into more or less fixed physical locations. The combat tasks are performed principally by the aircraft which cover relatively large geographical distances in the performance of these tasks and, upon completion, return to these established installations. Air operations are planned and controlled centrally at the wing level and are affected by rapidly changing tactical situations and the daily requirements of supported ground forces.

4802. AVIATION UNIT OPERATION PLAN (OPLAN)

a. The aviation unit operation plan is a formal document. The five-paragraph format is typical. Attachments may appear as overlays, tables, computer printouts, or in other formats which promote ease of understanding; but the sophistication will vary with the time available for preparation. When the commander issues an order to execute, the operation plan normally is redesignated an operation order retaining its numerical identity.

b. The operation plan normally states the aviation mission in broad, general terms, such as "provide landward extension of the amphibious task force air defense system" or, "be prepared to assume control of air operations in the objective area." The wing operation plan also states the mission of its subordinate elements in similar general terms, providing broad guidance to groups and squadrons for relatively long periods of time. Detailed orders for the conduct of specific tasks are issued separately on a day-by-day basis during an operation.

c. The attachments to the OPLAN amplify, as is necessary, the basic plan. Appendix B provides an example of a basic OPLAN and selected annexes. Some of the annexes referred to below, or elsewhere in this publication, have universal applicability throughout the Marine Corps and, for that reason, are not shown in appendix B, but may be found in the appropriate Fleet Marine Force manual. Highlights of an aviation unit operation plan are found in the following annexes:

(1) Task Organization.--This annex provides the task organization of the aviation unit and a listing of support organizations.

(2) Intelligence.--This annex provides essential elements of information, target lists, weather studies, and the enemy order of battle.

(3) Operations.--This annex provides guidance for the conduct of chemical, nuclear, electronic warfare, search and rescue, and fire support coordination operations.

(4) Logistics.--The POL, munitions, and engineer support is shown in this annex.

(5) Rules of Engagement.--The rules of engagement for the conduct of offensive air support are defined in this annex.

(6) Air Operations.--This large annex provides information vital to the efficient conduct of offensive air support. It includes aircraft schedules, armament, close air support, interdiction, and armed reconnaissance, flak suppression, air refueling, escort and cover, AAW coordination, air control, and air communication procedures

(7) Amphibious Operations.--This annex provides the wing landing plan and will include landing information on the DASC, ASRT's, and other combat, control, and support activities as appropriate.

4803. FRAGMENTARY ORDER

a. After the operation plan/order is issued, it is necessary to amplify portions of the order daily. The necessary amplification is published as a combat order in fragmentary form. This fragmentary order is usually issued to cover successive 24-hour periods, although it can be issued in any periodic sequence, depending upon the situation. It is issued in sections with each group and independent squadron receiving its applicable section initially by electronic means and subsequently, by courier delivery of a complete copy.

b. There is no standard format for the frag order. The frag normally provides instructions, such as the mission or event number; assigns the numbers and type of aircraft for each event; specifies times on target or on station, communication frequencies and call signs, ordnance load, rendezvous points, and other coordinating instructions as required. A close examination of the contents of a wing frag order provides an excellent illustration of the detailed and centralized planning that is accomplished at the wing level. An example of a typical frag order is found in appendix C.

4804. STANDING OPERATING PROCEDURES

a. External SOP's.--Standing operating procedures are used extensively in Marine aviation. Examples are the Naval Air Training and Operating Procedures Standardization Program (NATOPS) manuals published for each aircraft which cover ground and normal flight procedures. Tactical manuals delineate the tactical employment procedures for the aircraft and augment the NATOPS. The purpose of such publications is to ensure uniformity of procedures among various types of aircraft, and among the various services. This, in turn, enhances the operational integration of all assigned aviation assets.

b. Internal SOP's.--As task organized entities, the Marine aircraft wings and groups differ in their organizational structure and internal operation. Therefore, extensive use is made of SOP's to provide procedural guidance for subordinate units in all areas of operations, administration, and other support.

c. Joint Formats.--JCS Pub 12, Volume II, Tactical Command and Control Procedures for Joint Operations, establishes standing procedures in the form of joint procedures and formats of importance to aviation units. Those utilized in offensive air support operations are reproduced as follows:

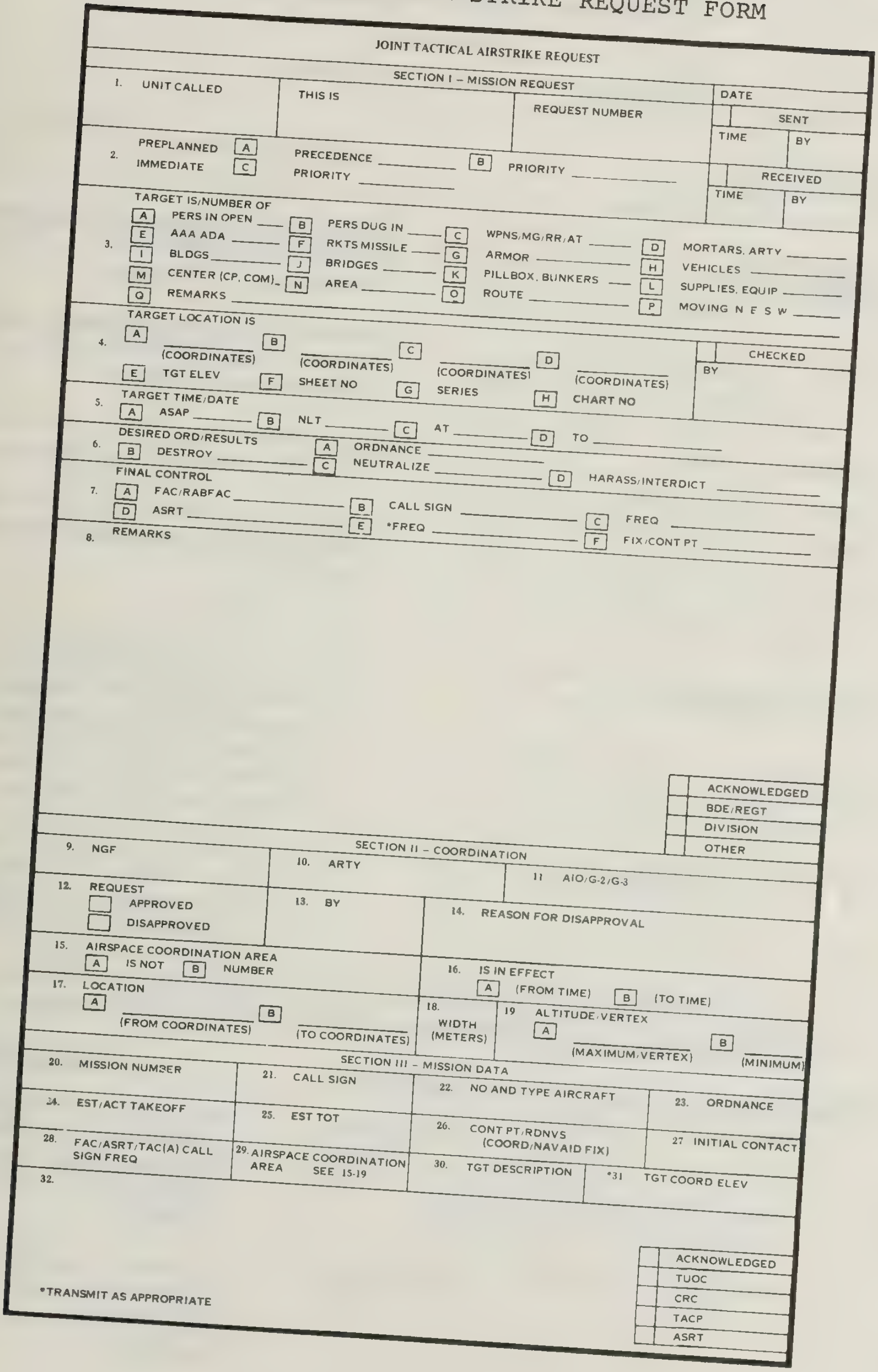
(1) Joint Tactical Air Strike Request in appendix A.

(2) Joint Air Strike Mission Data/Report (Close Air Support/ Air Interdiction) in appendix D.

(3) Mission Report in appendix E.

APPENDIX A

JOINT TACTICAL AIR STRIKE REQUEST FORM



JOINT TACTICAL AIRSTRIKE REQUEST

SECTION I – MISSION REQUEST

1. UNIT CALLED | THIS IS | REQUEST NUMBER | DATE

SENT: TIME | BY

2. PREPLANNED [A] IMMEDIATE [C] PRECEDENCE ______ PRIORITY ______ [B] PRIORITY ______

RECEIVED: TIME | BY

3. TARGET IS/NUMBER OF
[A] PERS IN OPEN ____ [B] PERS DUG IN ____ [C] WPNS/MG/RR/AT ____ [D] MORTARS, ARTY ____
[E] AAA ADA ____ [F] RKTS MISSILE ____ [G] ARMOR ____ [H] VEHICLES ____
[I] BLDGS ____ [J] BRIDGES ____ [K] PILLBOX, BUNKERS ____ [L] SUPPLIES, EQUIP ____
[M] CENTER (CP, COM) ____ [N] AREA ____ [O] ROUTE ____ [P] MOVING N E S W ____
[Q] REMARKS ____

4. TARGET LOCATION IS
[A] ____ (COORDINATES) [B] ____ (COORDINATES) [C] ____ (COORDINATES) [D] ____ (COORDINATES)
[E] TGT ELEV [F] SHEET NO [G] SERIES [H] CHART NO

CHECKED: BY

5. TARGET TIME/DATE
[A] ASAP ____ [B] NLT ____ [C] AT ____ [D] TO ____

6. DESIRED ORD/RESULTS
[B] DESTROY ____ [A] ORDNANCE ____ [C] NEUTRALIZE ____ [D] HARASS/INTERDICT ____

7. FINAL CONTROL
[A] FAC/RABFAC ____ [B] CALL SIGN ____ [C] FREQ ____
[D] ASRT ____ [E] *FREQ ____ [F] FIX/CONT PT ____

8. REMARKS

ACKNOWLEDGED
☐ BDE/REGT
☐ DIVISION
☐ OTHER

SECTION II – COORDINATION

9. NGF | 10. ARTY | 11 AIO/G-2/G-3

12. REQUEST
☐ APPROVED
☐ DISAPPROVED

13. BY | 14. REASON FOR DISAPPROVAL

15. AIRSPACE COORDINATION AREA
[A] IS NOT [B] NUMBER

16. IS IN EFFECT
[A] (FROM TIME) [B] (TO TIME)

17. LOCATION
[A] ____ (FROM COORDINATES) [B] ____ (TO COORDINATES)

18. WIDTH (METERS)

19 ALTITUDE/VERTEX
[A] ____ (MAXIMUM/VERTEX) [B] ____ (MINIMUM)

SECTION III – MISSION DATA

20. MISSION NUMBER | 21. CALL SIGN | 22. NO AND TYPE AIRCRAFT | 23. ORDNANCE

24. EST/ACT TAKEOFF | 25. EST TOT | 26. CONT PT/RDNVS (COORD/NAVAID FIX) | 27 INITIAL CONTACT

28. FAC/ASRT/TAC(A) CALL SIGN FREQ | 29. AIRSPACE COORDINATION AREA SEE 15-19 | 30. TGT DESCRIPTION | *31 TGT COORD ELEV

32.

ACKNOWLEDGED
☐ TUOC
☐ CRC
☐ TACP
☐ ASRT

*TRANSMIT AS APPROPRIATE

APPENDIX A

INSTRUCTIONS FOR USE OF THE JOINT TACTICAL AIR STRIKE REQUEST FORM

Section I.--(MISSION REQUEST)

Title and Element(s)	Explanation
Line 1. Unit called (Identifier)	1. Identifies the unit called by unit designation/call sign/preassigned number.
This is (Identifier)	Identifies the request originator by unit designation/call sign/preassigned number.
Request number	Indicates the originator's request number in series.
Sent	Indicates the time and the individual who transmitted the request.
Line 2.	2.
A. Precedence	A. For preplanned requests, indicates the requester's assignment relative to his other requests stated numerically in descending order of importance.
B & C. Priority	B & C. Use numerical designation below to define the tactical situation for preplanned (B) or immediate (C) request.

Priority--It is the responsibility of the requester to establish the priority. The categories of mission priority are:

Priority No.	Priority	Definition
1	Emergency	Targets which require immediate action and precedence over all other categories of mission priority.
2	Priority	Targets which require immediate action and take precedence over routine target.

Title and Element(s)	Explanation	
Priority No.	Priority	Definition
3	Routine	Targets of opportunity, targets which do not demand urgency in execution.
Received		Indicates the time and the individual who received the request.
Line 3. Target is/Number of	3. Describes the type, approximate size, mobility of the target to be attacked.	
Line 4. Target Location is	4. Locates the target by using the military grid reference system prescribed for the area concerned.	
A. Coordinates	A. Locates a point target or starting point.	
B. Coordinates	B. When used in conjunction with A, provides from ________ to ________ coordinates.	
C. Coordinates	C. When used in conjunction with A and B, provides a route.	
D. Coordinates	D. When used in conjunction with A through C, provides a route or describes a target area.	
E. Target Elevation	E. Target elevation in feet above sea level.	
F. Sheet No. ____	F. Self-explanatory.	
G. Series ____	G. Self-explanatory.	
H. Chart No.	H. Self-explanatory.	
Checked	Indicates with whom target information has been cross-checked.	
Line 5. Target Time/Date	5. Indicates the time/date when the airstrike is requested.	
A. ASAP	A. As soon as possible.	

Title and Element(s)	Explanation
B. NLT	B. The target is to be attacked before, but not later than the time indicated.
C. At	C. Indicates time at which target is to be attacked.
D. To	D. Denotes end of period of time in which support such as airborne alert or column cover is required. When used with Item C, use of Item B is unnecessary.
Line 6. Desired Ordnance/results	6. Indicates the requester's desired ordnance airstrike results.
A. Ordnance	A. Self-explanatory.
B. Destroy	B. Self-explanatory.
C. Neutralize	C. Self-explanatory.
D. Harass/Interdict	D. Self-explanatory.
Line 7. Final Control	7. Identifies the final controller (FAC), radar beacon FAC (RABFAC), TAC(A), ASRT who will conduct the attack briefing and control the release of ordnance.
A. FAC, TAC(A)	A. Self-explanatory.
B. Call sign	B. Self-explanatory.
C. Freq--Pri/Sec	C. Self-explanatory.
D. ASRT/RABFAC	D. Self-explanatory.
E. Freq--Pri/Sec	E. Self-explanatory.
F. Fix/Cont Pt	F. Military grid coordinates or navigational aid fix of a control point which is the furthest limit of an attack aircraft's route of flight prior to control by the final controller.

NOTE: This block may not apply to air interdiction missions.

Title and Element(s)	Explanation
Line 8. Remarks	8. Allows for the incorporation of other essential information not provided for in the request format.
Acknowledged Bde/Regt Division Other	Acknowledged indicates that the request has been copied for concurrence at brigade/regiment, division, and higher echelon. (Applies only to requests by ground forces.)
Section II.--(COORDINATION)	
Line 9. NGF	9. Naval gunfire coordination.
Line 10. ARTY	10. Artillery coordination.
Line 11. AIO/G-2/G-3	11. Air Intelligence Officer, G2, G3, or other Service equivalent coordination.
Line 12. Request A. Approved B. Disapproved	12. Indicates the approval or disapproval of the request.
Line 13. By	13. Indicates the individual who approved or disapproved the request.
Line 14. Reason for disapproval	14. Self-explanatory.
Line 15. Airspace Coordination Areas A. Is not in effect B. Number	15. Safety measures for friendly aircraft. The airspace coordination area establishes airspace that is reasonably safe from friendly, surface-delivered, nonnuclear fires. A plan number is issued, as appropriate.
Line 16. Is in Effect A. From time B. To time	16. Establishes the time period that the applicable plan will be in effect.

Title and Element(s)	Explanation
Line 17. Location	
A. From--coordinates	A. Military grid coordinates by bearing and distances from a known navigation aid.
B. To--coordinates	
Line 18. Width (meters)--from either side of the centerline defined by the above coordinates.	
Line 19. Altitude/VERTEX (use subitem A for VERTEX only entry).	
A. Maximum/VERTEX	Given in mean sea level (MSL) altitude; altitude above sea level.
B. Minimum	

Section III.--(MISSION DATA)

Line 20. Mission Number	20. Indicates mission number.
Line 21. Call sign	21. Flight call sign of mission aircraft.
Line 22. No. and Type Aircraft	22. Self-explanatory.
Line 23. Ordnance	23. Type of ordnance either by code number or actual nomenclature.
Line 24. Est/Act Takeoff	24. Estimated or actual time the mission aircraft will take off.
Line 25. Est TOT	25. Estimate time on target.
Line 26. Cont Pt/RDNVS (Coord/ NAVAID FIX)	26. The furthest limit of the attack aircraft's route of flight prior to control by the final controller. It should be the same as Line 7, Item F, when designated in the request.
Line 27. Initial Contact	27. Indicates the initial control agency the flight is to contact.
Line 28. FAC/ASRT/TAC(A) Call Sign Freq	28. Call sign of final control agency and frequency.
Line 29. Airspace Coordination Area	29. Refer to Blocks 15 through 19 for this data.
Line 30. Tgt Description	30. Self-explanatory.
Line 31. Tgt Coord/Elev	31. Self-explanatory.

NOTE: Section III mission data information transmitted to the requesting agency may be limited to those items not included in the request.

APPENDIX B

EXAMPLES OF SELECTED ATTACHMENTS TO AN OPERATION PLAN

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TAB A (Air Fire Support) to APPENDIX 12 (Fire Support) to ANNEX C (Operations) to 4th MAW OPLAN 9999 (U)

(U) Ref: (a) 4th MARDIV OPLAN 9999 (U)
(b) IV MAF/CTF-65 OPLAN 9999 (U)
(c) FMFM 7-1, Fire Support Coordination
(d) FMFM 5-4, Offensive Air Support

1. (U) GENERAL

a. Purpose..--The purpose of this tab is to provide a graphic illustration of the preplanned airstrikes scheduled in direct support of the 4th MARDIV scheme of maneuver (see reference (a)). This tab also appears in Appendix 12, Annex C, references (a) and (b), joining similar tabs for artillery and naval gunfire to reflect the fire plans of all supporting arms within the framework of a single document.

b. Scope.--Enclosures 1 through 3 of this tab reflect all prearranged air fire to be furnished by LFA within the 4th MARDIV area of responsibility on D-day, including on-call and on-station aircraft.

c. Definitions.--Standard definitions as listed in references (c) and (d) will be used. The following are essential:

(1) Preplanned Air Support.--Air support in accordance with a program planned in advance of operations.

(2) Prearranged Fire.--Fire that is formally planned and executed against targets or target areas of known location ... and is executed at a predetermined period of time.

(3) On-Call.--The term used to signify that a prearranged concentration, airstrike, or final protective fire may be called for.

(4) Call Mission.--A type of air support mission which is not requested sufficiently in advance of the desired time of execution to permit detailed planning and briefing of pilots prior to takeoff. Aircraft scheduled for this type of mission are on air, ground, or carrier alert, and are armed with a prescribed load. Call missions respond to immediate mission requests.

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(5) Direct Air Support.--An air support mission requiring an aviation combat element to support a specific ground combat element and authorizing it to answer directly to a request for assistance. Direct air support includes close air support, air reconnaissance, and assault support missions; each must be coordinated with the supported ground commander and executed within his area of responsibility.

(6) Area of Responsibility.--The area of responsibility is that delineated area of terrain in which an infantry commander can deploy his troops (including patrols) and can engage targets without specific approval or clearance from higher headquarters. The ground combat element commander has absolute control of the terrain and airspace encompassed by his area of responsibility boundaries.

2. (U) CONCEPT OF AIR FIRE SUPPORT

Landing force aviation (LFA) provides air fire in direct support of 4th MARDIV amphibious assault. Each unit of the ground combat element prepares a plan for air fire support to compliment naval gunfire and artillery fire plans. This plan represented the ground unit's initial request for air fire support to be delivered in the ground unit's area of operations; initial requests were forwarded via the chain of command for analysis modification, approval, and incorporation into the fire support plan for each succeeding ground unit. Upon approval by the CLF, each ground unit prepares an Air Fire Support Tab (Tab A, Appendix 12 to Annex C). It includes all preplanned airstrikes to be furnished that unit, whether from LFA or other air elements supporting the amphibious task force.

3. (U) CONDUCT OF AIR FIRE SUPPORT

a. Pre-D-Day Air Fire.--Landing force (TF-65) requirements for pre-D-day air operations concern primary intelligence needs and fire support to reduce the enemy's ability to withstand the amphibious assault. LFA (TG-65.3) conducts pre-D-day air operations in accordance with Tab A, Appendix 7, Annex P.

b. D-Day Air Fire.--LFA provides air fire in direct support of 4th MARDIV, in accordance with enclosures (1) through (3):

(1) Aircraft deliver prearranged fire for pre-H-hour neutralization of landing beaches and helicopter landing zones.

(2) Commencing H-hour, conducts close air support by delivering prearranged fire, both scheduled and on-call, against targets selected for destruction.

(3) LFA aircraft scheduled for close air support call missions are listed in enclosure (1) to this tab.

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c. Post-D-Day Air Fire.--Air fire in direct support of 4th MARDIV in accordance with Tabs C and D, Appendix 2, Annex M and daily frag orders.

d. Coordinating Instructions

(1) Pre-H-hour airstrikes directed by TAC(A). Airborne forward air controllers mark targets as required.

(2) As FAC's become operational ashore, they will originate all requests for on-call airstrikes within the fire support coordination line.

(3) FSCL's as delineated; enclosure (3) to this tab.

(4) Immediate mission requests will be received by the TACC, referred to the fire support coordinator, and the supporting arms coordinator. Call mission aircraft will be assigned as appropriate.

(5) Airspace coordination areas and general safety procedures as set forth in Appendix 2, Annex M.

4. ( ) ADMINISTRATION AND LOGISTICS

a. Administration

(1) BDA reports received by TAC(A), AFAC's, and flight leaders will be submitted in accordance with paragraph 4, Annex M.

(2) Any changes or modifications to Enclosures (1) through (3) of this tab will be directed by frag order.

b. Logistics.--See Annex D.

5. ( ) COMMAND AND SIGNAL

a. TAC(A) call sign: PLAYBOY.

b. FAC position marking: Red smoke plus mirror signal on request.

c. Code word for mirror signal: EIGHTBALL.

d. Emergency signal to lift airstrike: Green star cluster.

e. Emergency code word to lift airstrike: BEATNIK, acknowledge.

Enclosures:
1 - Preplanned Close Air Support
2 - Air Targets
3 - Air Target Overlay

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ENCLOSURE 1 (Preplanned Close Air Support) to TAB A (Air Fire Support) to APPENDIX 2 (Fire Support) to ANNEX C (Operations) to Operation Order 19-7.

LN #	(a) TGT #	(b) TYPE MSN	(c) AIRCRAFT ORDNANCE	(d) TOT/ TIME ON STA	(e) ATK DIR	(f) PULL OUT DIRECTION	(g) TGT MARKING	(h) CONTROL AGENCY	(i) REMARKS
1	AZ 0001	PREP	VMA 10 KT	H-25	090°	-	-	DASC	BRIEFING AND CONTROL PTS BY LF AIR
2	AA 9001	PREP	VMA WETEYE GB	H-25	040°	-	-	DASC	-do-
3	AZ 9029	CAS	VMA SPRAY VX	GND ALERT ON CALL H-60 to H+60	090°	-	-	DASC	-do-
4	AZ 9031	CAS	VMA SPRAY VX	AIR ALERT ON CALL H-25 to H+10	100°	-	-	DASC	-do-
5	XZ 2003	CAS	VMA 500 GP RKT/20MM	H-2 HRS	045°	-	RKT	TAC(A)	TAC(A) MARKS CTR TGT W/RKTS
6	AB 3536	CAS	VMA NAPALM 20MM	H-5 to H+5	090°	-	WP	FAC	NGF MARKS ON REQ FLT LDR
7	AB 1261	CAS	VMA NAPALM SNAKE EYE	H-4	060°	-	YELLOW SMOKE	FAC	ARTY MARKS ON REQ FLT LDR
8	XZ 2005	CAS	VMA 500 GP RKT/20MM	H-HOUR	070°	-	RKT	TAC(A)	TAC(A) MARKS CTR TGT W/RKTS

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ENCLOSURE 2 (Air Targets) to TAB A (Air Fire Support) to APPENDIX 2 (Fire Support) to ANNEX C to Operation Order 19-7.

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
LN #	TGT #	TGT DESCRIPTION	TGT COORD-UTM	SIZE (METERS)	DIRECTION/DISTANCE FRIENDLY UNITS	SOURCE	REMARKS
1	AZ 0001	RKT LCHR	2660 1790	PT TGT	170°/-	II-100	HEAVY FOLIAGE
2	AA 9001	INF ASSY AREA	248 128	2000X 1000	180°/2000	AO-100	IMMEDIATE CASUALTIES
3	AZ 9029	INF ASSY AREA	279 128	1200X 800	175°/2000	AO-100	IMMEDIATE CASUALTIES CONTAMINATE AREA
4	AZ 9031	INF ASSY	2590 1350 TO 2620 1350	2300X 500	190°/3500	AOO-100	-do-
5	XZ 2003	AA RADAR SITE	249 168	PT TGT	140°/6500M	II-50	IF NOT DESTROYED BY AIR, NGF WILL ATK
6	AB 3536	TRENCH W/MG	290 116	100X 2200	180°/500M	OP-50	SKED BY NGF
7	AB 1261	AW BUNDER	270 115	PT TGT	180°/500M	AO-100	SKED BY ARTY
8	XZ 2005	FROG 2 SITE	2950 1750	200X 200	180°/7000M	II-50	IN DEFILADE

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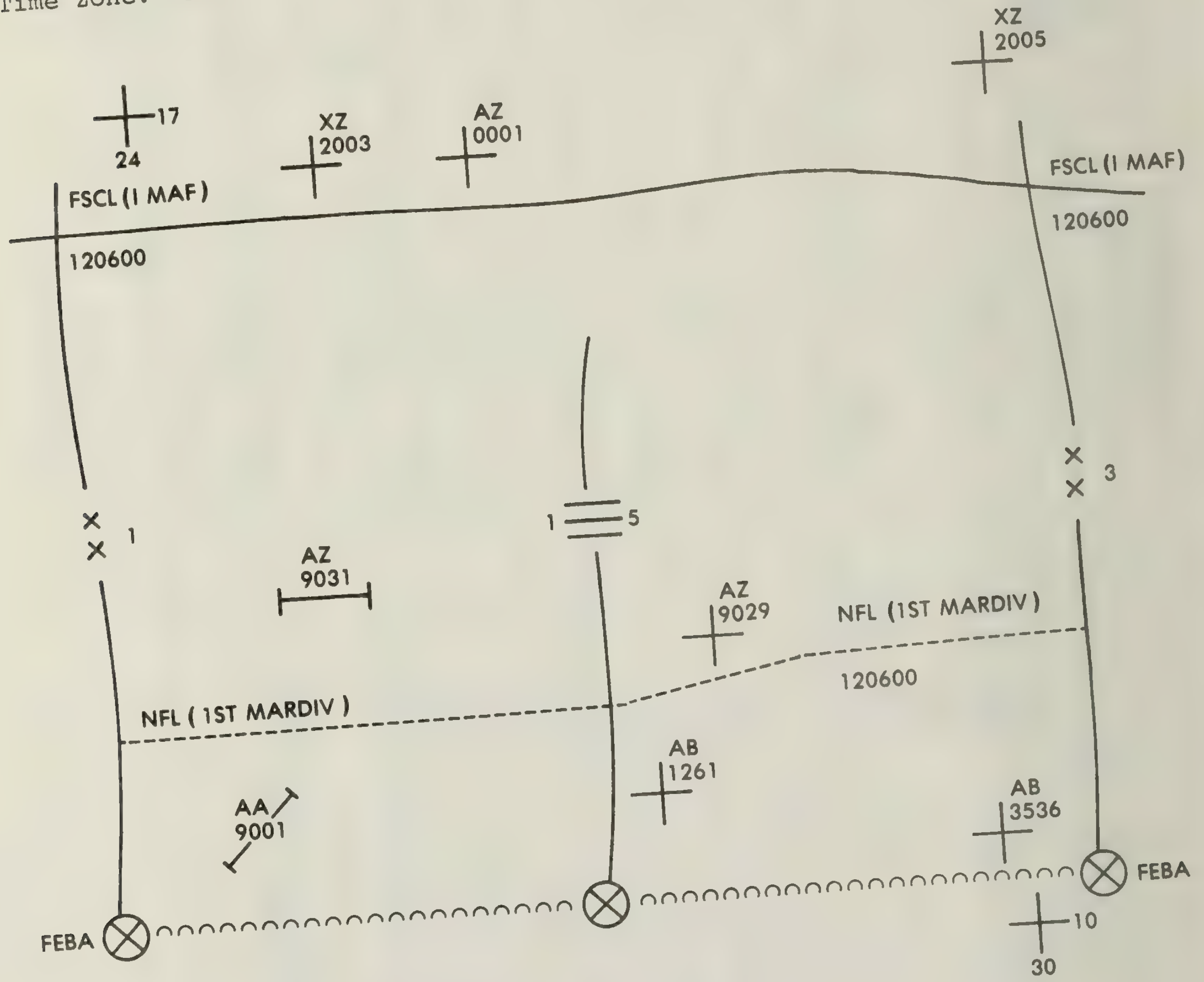
ENCLOSURE 3 (Air Target Overlay) to TAB A (Air Fire Support) to APPENDIX 2 (Fire Support) to ANNEX D (Operations) to Operation Order 19-7.

Ref: (a) Map: Series J741, Sheets II, III

Time Zone: Zulu



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ENCLOSURE 1 (Aircraft Availability Form) to TAB D (D+2 On-Aircraft Schedules) to APPENDIX 7 (Aircraft Schedules) to ANNEX M (Air Operations) to OPLAN _______(U)

1. The format below is an example of how aircraft availability should be summarized. This form will be submitted by MAG commanders to the MAW operations and is an estimate of aircraft available for the day following the day of submission. The time at which such forms are to be submitted will be established by the wing commander, but it must be soon enough to provide planning information in scheduling the next day's operations, probably in the very early evening.

AIRCRAFT AVAILABILITY FORM

Period Covered (date/time group) to (date/time group)

Type Aircraft	Number of Aircraft	Aircraft Availability	Authorized Daily Sortie Rate	Total Sorties Available At One Time	Total Sorties Available 24 Hours	Remarks
F-4	24	65%	1.2	15	28	-

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TAB A (Armament Codes) to APPENDIX 6 (Armament) to ANNEX M (Air Operations) to OPLAN ________ (U)

( ) References:

1. Experience has shown that it is expedient to establish armament codes to designate not only individual weapons, but specific aircraft ordnances mixes as well. Such codes provide both a modicum of secrecy and an economy of language which is especially important in aviation; radios are tied up for relatively shorter periods of time when flights check in ordnance codes to FAC's or TAC(A)'s rather than by specific numbers and types of ordnance. It is also much easier for planners to call for an ordnance mix by a coded word. Once a planner knows the nature of the target or the probable target, he consults his tables of available ordnance and the Joint Munitions Effectiveness Manuals and designates the appropriate load for the aircraft.

2. There are no set armament codes; the system established is arbitrary. In Vietnam, the "Delta" code was created as the word designator for individual airborne weapons. A Delta-1, was a 250 pound, low drag bomb; a Delta-2 was a 500 pound low drag, etc. To designate specific ordnance mixes, the names of American cars were employed. For instance, the code word "Buick" might mean one napalm tank, ten 500-pound bombs, and 20mm cannon.

3. The enclosures of Tab B of this appendix will, when filled in, show the armament load codes established by the planners for an air OPLAN.

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APPENDIX 2 (Air Support) to ANNEX M (Air Operations) to ________ OPLAN ______ (U)

( ) References: Maps (Should have military grid reference system.)

1. ( ) GENERAL

This appendix addresses the delivery of ordnance in support of ground combat elements within the geographic limits imposed by the fire support coordination line.

2. ( ) CONCEPT

Delineate concept of close air support (numbers of sorties available for preplanned and alert missions, number of aircraft in normal flight, integration with other fire support means, types of targets to be assigned CAS, etc).

3. ( ) CONDUCT

a. Priorities.--Address means/methods for establishing priorities in assigning targets to CAS aircraft and in assigning air support to specific units.

b. Air Requests

(1) Preplanned.--Address method for processing preplanned CAS requests at appropriate level.

(2) Immediate.--Address method for processing immediate CAS requests at this command level, be it requesting or authorizing and ordering.

c. Tactical Air Control Procedures.--In accordance with Tab A to this appendix.

d. AFAC Procedures.--In accordance with Tab B to this appendix.

e. BDA Reporting Procedures.--In accordance with Tab C to this appendix.

f. Target Marking for Air Attack.--In accordance with Tab D to this appendix.

g. Air Support Radar Team Procedures.--In accordance with Tab E to this appendix.

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h. Aircraft Alert Status

(1) Alert Conditions for CAS Aircraft

CONDITION	STATUS	ARMAMENT

(2) Alert Stations for Aircraft.--Define airborne alert stations.

i. Aircraft Armament

(1) Loads as specified by daily fragmentary orders. Unless otherwise stated, all loads include full internal armament.

(2) Pilots include numbers of each type of ordnance carried when making armament reports.

(3) Armament codes in accordance with Tab A to Appendix 6 to this annex.

j. Attack Limitations.--Provide specific guidance for air attacks reflecting enemy antiair threat, anticipated weather interference, terrain clearance minimums for night operations, etc. as appropriate.

4. ( ) ADMINISTRATION AND LOGISTICS

a. Administration.--Address consolidation and forwarding of preplanned air requests, BDA reports, etc. as appropriate. Aircraft availability and schedules in accordance with Appendix 7 to this annex.

b. Logistics.--Designate source of supply for RABFAC beacons, laser designators, landing zone marking lights, panels, marking smoke, etc., as appropriate.

5. ( ) COMMAND AND SIGNAL

a. Command Relationships.--Define authority to request, approve, countermand, and/or modify divert close air support missions.

b. Signal.--Air-to-ground signals in accordance with Tab F to this appendix. Refer to appropriate element of plan for instructions, i.e., Tab D to Appendix 1 to Annex K for frequency assignments. At battalion level, it may be desirable to list appropriate frequencies in this subparagraph.

TABS:

A	Tactical Air Control
B	Airborne Forward Air Controller Procedures
C	Bomb Damage Assessment Reporting Procedures
D	Target Marking for Air Attack
E	Air Support Radar Teams Procedures
F	General Instructions and Safety Procedures

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TAB A (Tactical Air Control Procedures) to APPENDIX 2 (Air Support) to ANNEX M (Air Operations) to _____ OPLAN _____ (U)

( ) References:

1. ( ) GENERAL

Tactical air control procedures are provided for guidance to appropriate agencies in the air control chain. Primary emphasis will be placed on control during the delivery phase of the evolution.

2. ( ) CONCEPT

General concept is that close air support will always be conducted under positive control to ensure accuracy of delivery and troop safety.

3. ( ) CONDUCT

a. Sequencing.--Control sequencing will be from DASC to delivery controller (FAC, FAC(A), AFAC, ASRT) back to DASC.

b. Briefing.--Pilots will be briefed on missions by DASC while inbound to target area utilizing mandatory items for CAS as depicted on Enclosure (1) to Tab A to this appendix. Remainder of items, as appropriate, will be briefed by the terminal delivery controller. Additionally, FAC's FAC(A)'s, and AFAC's will brief pilots on wind conditions, flight or navigation hazards, target marking methods, and will repeat such items as have been briefed by DASC as are appropriate.

c. Orbit Points.--Define orbit points for CAS aircraft or refer to Tab B, Appendix 14 to this annex. State agency authorized to clear aircraft from orbit point to target.

d. Contact Points.--Define position at which mission leader makes initial radio contact with the forward air controller.

e. Target Marking.--In accordance with Tab D to this appendix.

f. Marking Friendly Positions.--Friendly positions will be marked by panel/smoke mirror, light, etc. Under no circumstances will pilots deliver ordnance when the position of friendly forces is in question.

g. Delivery

(1) Methods.--Establish the authority for determining fusing selections, dive angles, number of drops per run, number of runs, etc.

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(2) Clearance.--Establish methods to be used to clear aircraft to drop ordnance.

(3) Corrections.--Delivery correction methods must be defined (normally in meters on a clock code relative to the run-in line). If the enemy threat dictates multiple run-in headings, an alternate must be provided.

h. Exit Routes.--Self-explanatory.

4. ( ) ADMINISTRATION AND LOGISTICS

a. Administration.--BDA reports in accordance with Tab C to this appendix.

b. Logistics

5. ( ) COMMAND AND SIGNAL

a. Command

b. Signal

(1) No radio instructions.

(2) Emergency signal to lift airstrike.

(3) Emergency code to lift airstrike.

ENCLOSURES:

1 Tactical Air Request Form
2 Forward Air Controller Party Instructions

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ENCLOSURE 1 (Tactical Air Request Form) to TAB A (Tactical Air Control Procedures) to APPENDIX 2 (Air Support) to ANNEX M (Air Operations) to ______ OPLAN ______ (U)

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ENCLOSURE 2 (Forward Air Controller Party Instructions) to TAB A (Tactical Air Control Procedures) to APPENDIX 2 (Air Support) to ANNEX M (Air Operations) to _____ OPLAN _____ (U)

( ) Ref: (a) FMFM 5-4
(b) FMFM 5-3
(c) NWIP 22-2

1. ( ) GENERAL

FAC parties serve as extensions of the air control system to advise and assist the ground commander on air support operations.

2. ( ) CONCEPT

FAC parties will be employed as instructed by the ground commander. (Ground commander will state manner in which FAC parties are to be employed.)

3. ( ) CONDUCT

a. Air Requests

(1) Preplanned.--Preplanned requests will be submitted to ________ via ________ using ________ method.

(2) Immediate.--Immediate requests will be submitted directly to the DASC on the TAR net. Battalion (regiment and division TACP's will monitor and approve by remaining silent and countermand or modify by ________________.

(3) Format.--Close air support requests will be submitted in accordance with the format provided in Enclosure 1 to Tab A to this appendix. Forms will be completed in accordance with instructions contained in reference (a).

b. Armament Codes.--Armament codes in accordance with Tab A to Appendix 2 to this annex will be used for all air support requests and briefings.

c. Marking Friendly Positions.--Ensure that friendly positions/ locations are clearly marked as defined in accordance with instructions contained in references (a) and (b) or Tab A to this appendix.

d. Air Control Procedures.--In accordance with Tab A to this appendix.

e. Target Marking Procedures.--In accordance with Tab D to this appendix.

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TAB B (Airborne Forward Air Controller Procedures) to APPENDIX 2 (Air Support) to ANNEX M (Air Operations) to _____ OPLAN _____ (U)

( ) Ref: (a) FMFM 5-4, Offensive Air Support
(b) FMFM 5-3, Assault Support

1. ( ) GENERAL

AFAC's serve as extensions of the air control system to control airstrikes in support of the ground commander. They may also control artillery and naval gunfire if conditions warrant such assistance.

2. ( ) CONCEPT

AFAC's employment to be outlined. Normally, they shall be used to assist the TACP's in controlling airstrikes against targets which cannot be observed by ground FAC's. They may also serve as extensions of the TACC in the control of airstrikes beyond the FSCL. Numbers airborne and range of operations must be outlined.

3. ( ) CONDUCT

a. Air Requests.--Air requests generated by AFAC's will normally be immediate requests. Although AFAC's may control both immediate and preplanned, requests are normally generated from the analysis of the AFAC debrief rather than direct requests submitted by the AFAC.

(1) Priorities.--Establish guidance for the assignment of priorities to air requests submitted by AFAC's.

(2) Submission.--Establish method of submitting immediate air requests by AFAC's. Normally, missions within FSCL will go to DASC, beyond FSCL will to to TACC or should radio relay range require it, to TAC(A).

(3) Format.--Close air support requests will be submitted in accordance with the format provided in Enclosure 1 to Tab A to this appendix. Forms will be completed in accordance with the instructions contained in reference (a).

b. Armament Codes.--Armament codes in accordance with Tab A to Appendix 2 to this annex will be used for all air support requests and briefings.

c. Marking Friendly Positions.--Ensure that friendly positions/locations are clearly marked in accordance with instructions contained in references (a) and (b) or Tab A to this appendix. If targets

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are greater than _____ meters from nearest friendly positions, then friendly positions need not be specifically defined or marked.

d. Air Control Procedures.--In accordance with Tab A to this appendix.

e. Target Marking Procedures.--In accordance with Tab A to this appendix.

f. BDA Reporting Procedures.--In accordance with Tab C to this appendix.

g. Air Raid Warnings.--Monitor TAR net for air defense warning conditions. (Local action and dissemination of information in accordance with Appendix 4 to Annex Q.)

h. FAC(A).--Provide guidance for employment of FAC in an airborne with Tab F to Appendix 2 to this annex.

i. Coordinating Instructions

(1) External.--Fire support coordination will be in accordance with Tab F to Appendix 2 to this annex.

(2) Internal.--Ground commander provides instructions for coordination of his air fire support with his organic weapons such as mortars, etc.

4. ( ) ADMINISTRATION AND LOGISTICS

5. ( ) COMMAND AND SIGNAL

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TAB C (Bomb Damage Assessment Reporting Procedures) to APPENDIX 2 (Air Support) to ANNEX M (Air Operations) to ______ OPLAN ______ (U)

( ) Ref:

1. ( ) GENERAL

BDA reports will be made in conjunction with all close air support missions to provide an instant means of assessing the need for additional fire on the target(s).

2. ( ) CONCEPT

BDA reports will be provided by the FAC, FAC(A), or AFAC to the flight leader for each close air support mission. The flight leader, in turn, provides the report to the appropriate air control agency DASC or TACC as required.

3. ( ) CONDUCT

a. Evaluation.--Upon completion of airstrikes, controllers will make evaluations of damage inflicted on enemy forces.

b. Reporting

(1) By FAC's and FAC(A)'s. (Prescribe report channels for each, i.e., to pilots, DASC, TACC, ground commander, etc.)

(2) By AFAC's. (Prescribe report channels for each, i.e., to pilots, DASC, TACC, ground commander, etc.)

c. Items Reported.--Each report will evaluate or identify the following:

(1) Target (number, coordinates, and type).

(2) Time (on and off target).

(3) Ordnance expended. Self-explanatory.

(4) Target damage. (Completely/partially destroyed/neutralized, unknown, etc. terms to be utilized, must be defined herein.)

(5) Enemy action. (None to heavy, type weapons, ground or air, etc. terms to be utilized must be defined herein.)

(6) Remarks. Self-explanatory.

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TAB D (Target Marking for Air Attack) to APPENDIX 2 (Air Support) to ANNEX M (Air Operations) to _____ OPLAN _____ (U)

( ) Ref:

1. ( ) GENERAL

Target marking for air attack is a necessity to ensure accuracy of delivery and safety of friendly forces. Methods vary with resources available. Enemy camouflage is excellent, making detection difficult, etc.

2. ( ) CONCEPT

Define the concept for the marking of close air support targets. The methods and timing outlined must recognize the enemy threat and reaction capabilities as well as the means available to friendly forces.

3. ( ) CONDUCT

a. Target Designation

(1) Map Coordinates.--Give degree of coordinates (8-digit) definition required, maximum safe distance from friendly forces for use of this method, etc.

(2) Geographic Location.--Distance and direction from a known landmark or natural feature, also called reference point method. Define limits for this type control.

(3) Panel Method.--Panels displayed in a "T" aligned with the target along the run-in line so that pilot overflies panels on run-in to target. Define dimensions and/or restrictions to use.

(4) Observing and Directing.--FAC "talking pilot in." This involves corrections in the run-in to target.

b. Target Marking

(1) Artillery.--Define types of marking methods and request procedures.

(2) Naval Gunfire.--Define types of marking methods and request procedures.

(3) Air.--Define types of marking to be used.

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(4) Mortars.--Define types of marking methods and request procedures.

(5) Tanks.--Define types of marking methods and request procedures (of particular importance in motorized/mechanized operations).

(6) Machineguns.--Intersecting fires of particular value in dusk or night operations. Define methods to be used.

(7) Illumination.--Define types of illumination to be used and request procedures.

(8) RABFAC Beacon.--In accordance with Enclosure 1 to this tab.

(9) Laser Designation.--In accordance with Enclosure 2 to this tab.

c. Coordination.--Define coordination of marking means with air support aircraft to ensure safety.

4. ( ) ADMINISTRATION AND LOGISTICS

a. Administration

b. Logistics

5. ( ) COMMAND AND SIGNAL

a. Command

b. Signal

ENCLOSURES:

1 RABFAC Beacon Instructions (Omitted)
2 Laser Designator Instructions (Omitted)

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TAB E (Air Support Radar Team Procedures) to APPENDIX 2 (Air Support) to ANNEX M (Air Operations) to OPLAN _____ (U)

( ) Ref:

1. GENERAL

A number of items must be considered when planning the employment of an air support radar team. The specific tactical situation encountered will dictate the precise methods of employment and procedures used, however, some general guidelines can be provided which should be constant in all situations.

2. ASRT EMPLOYMENT CONSIDERATIONS

In order to make the most effective use of the ASRT, the selection of the radar site is of prime importance. The following stipulations must be considered:

a. Terrain.--High terrain is best, since terrain masking limits the use of the radar. If a depressed area is selected for the employment of an ASRT, the surrounding terrain will likely block out portions of the radar and thus reduce its effectiveness in the conduct of missions.

b. Accurate Positioning of ASRT's.--The ASRT must know precisely its location on the ground in order to provide precise information to aircraft that are working with it. Target locations are determined in relation to the ASRT location and error in this area could be fatal. In addition to a level survey, the ASRT requires at least four calibrator flights by aircraft dropping ordnance. The flights must be accompaniied by an air observer.

c. Target Proximity.--Prior to deploying the ASRT's into the FEBA, commanders must give careful consideration to the areas in which he can place the ASRT. They should be positioned within range of the most probable target areas.

d. Protection.--Although the ASRT should be located relatively close to enemy targets, it should, nevertheless, be very well protected by friendly forces. The ASRT provides an important and potent link between the ground and air forces which vastly extends the fire support measures available to ground units.

3. ANCILLARY CAPABILITIES OF THE ASRT

Commanders and planners should keep in mind that ordnance delivery is only one of several uses of the ASRT. It can also position aircraft for:

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a. Photographic reconnaissance.

b. Paradrop of troops or supplies.

c. Insertion of troops/supplies into landing zones.

d. Medevac.

e. Limited GCA.

4. MISSION ASSIGNMENT SEQUENCE

ASRT targets are normally developed by the division targeting system. The ASRT target is forwarded to the DASC, and the DASC passes the information to the ASRT. If time permits, the TACC is also notified of the target coordinates. A frag order is sent to the squadron earmarked for the assignment which usually contains:

a. Call signs.

b. Frequencies/alternates.

c. A position (usually a TACAN fix) where contact is to be made with the ASRT, if radar flight following is not available in the AOA.

d. Altitude.

e. Ordnance load.

f. Nature of the target.

5. AVAILABILITY OF BEACON CONFIGURED AIRCRAFT

The capabilities of the ASRT are enhanced when ASRT beacon equipped aircraft are used. Aircraft scheduling should be adjusted to ensure that such aircraft are employed when ASRT missions are fraged.

6. AIRBORNE PROCEDURES

Airborne procedures normally follow the briefed pattern which is conducted in consonance with the frag order. It may be important to mention two aspects of the airborne procedures for emphasis. These are:

a. The ASRT searches for the incoming assigned aircraft at the prebriefed location in the sky. It is, therefore, crucial that the TACAN fix or location over the ground designated in the brief be closely adhered to by the aircrew. This is also true of the altitude assigned.

b. Although all aircraft are capable of flying ASRT missions, only the A-4 is equipped with the fully automatic system, through which the ASRT can not only maneuver the A-4 over the target, but can automatically release the ordnance.

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7. BDA PROCEDURES

The nature of the normal ASRT mission (e.g. at night, out of visual contact with an observer) makes damage assessment often extremely difficult to obtain. But, such information is essential and either the attack aircraft, the ASRT, or a reconnaissance aircraft should obtain BDA information and transmit it to the appropriate authorities as soon as it is feasible. Every effort should also be made to ensure that the ground intelligence system is cognizant of damage assessments. If the target remains a threat, then it must be either reattacked or avoided.

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TAB F (General Instructions and Safety Procedures) to APPENDIX 2 (Air Support) to ANNEX M (Air Operations) to _____ OPLAN _____ (U)

( ) Ref: (a) FMFM 5-2 Series, Joint Munitions Effectiveness Manuals

1. ( ) GENERAL

Coordination of fire support means is a necessity to preserve assets and provide for the safety of friendly forces thus enabling the massing of fire power effectively and efficiently.

2. ( ) CONCEPT

The application of air power must be coordinated with other means, not only for safety purposes, but also to ensure the proper application of sufficient force without piecemealing fires on a given target or over expending ordnance.

3. ( ) CONDUCT

a. Target Evaluation.--Evaluation of the target to establish requirements for the amount of ordnance required should be conducted in accordance with appropriate JMEM's (reference (a).

b. Altitude Separation.--Define any altitude restrictions or separations to be used by aircraft enroute within the target areas (must be coordinated with guidance provided to helicopters, AFAC aircraft, etc.).

c. Route Separations.--Define route restrictions or separations to be used by aircraft en route within the target areas.

d. Bingo Requirements.--Identify BINGO fields and fuel for CAS and AFAC aircraft as appropriate.

e. Weather.--Provide instructions on adjustments to be made for weather factors such as criteria for changing to armanent for low level delivery, penetration, and departure procedures, etc.

f. Troop Safety.--Establish criteria for closest proximity to friendly troops for the delivery of each type of ordnance.

g. Fire Support Coordination.--Recap briefly methods to be used for coordination by appropriate agencies within the command (TACP, AFAC, DASC, etc.) to resolve potential or actual fire support (to include mortars) conflicts. Fire support coordination line for initial stages of operation show in Enclosure 1 of this tab. Airspace

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coordination area guidance for pilots and air controllers is contained in Enclosure 2 to this tab.

4. ( ) ADMINISTRATION AND LOGISTICS

5. ( ) COMMAND AND SIGNAL

ENCLOSURES:

1 Fire Support Coordination Line
2 Airspace Coordination Area

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ENCLOSURE 1 (Fire Support Coordination Line) to TAB F (General Instructions and Safety Procedures) to APPENDIX 2 (Air Support) to ANNEX M (Air Operations) to _____ OPLAN _____ (U)

( ) Ref:

1. ( ) GENERAL

The fire support coordination line is an imaginary line arranged, if possible, to follow well defined geographical features forward of which supporting forces may attack targets without danger or reference to the ground forces.

2. ( ) CONCEPT

The FSCL is prescribed by the ground commander and coordinated with appropriate supporting; i.e., air, naval gunfire (NGF), artillery commanders. Behind the FSCL target, attacks not under control of the ground commander, must be coordinated with the ground commander. Beyond the FSCL, attacks by a supporting force must be coordinated with other supporting forces.

3. ( ) CONDUCT

a. Prescribing the FSCL.--Describe means for prescribing the FSCL and for disseminating the trace of the FSCL.

b. Trace of the FSCL.--The trace of the FSCL will be defined for each day that aircraft schedules are published in Appendix 7 to this annex. (The trace should be descriptive and easily transferrable to maps used in the cockpit. Thus, it will read "from coordinates NE along Swamp River to the bridge at coordinates thence N along Highway 100 to the railroad/highway junction at coordinates, continuing W along the railway to the rail tunnel at coordinates then SW along the ridgeline terminating at coordinates.) The hour at which the new trace is to become effective must also be indicated.

(1) Pre-D-day.

(2) D-day.

(3) D+1.

(4) D+2.

c. Coordination.--Coordination instructions are to be written (for the appropriate command issuing this enclosure) to define the means

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by which air attacks conducted behind the FSCL will be coordinated with the ground commander and other supporting arms.

(1) Air-ground coordination.

(2) Air-artillery coordination.

(3) Air-NGF coordination.

4. ( ) ADMINISTRATION AND LOGISTICS

a. Administration

b. Logistics

5. ( ) COMMAND AND SIGNAL

a. Command

b. Signal

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ENCLOSURE 2 (Airspace Coordination Area) to TAB F (General Instructions and Safety Procedures) to APPENDIX 2 (Air Support) to ANNEX M (Air Operations) _____ OPLAN _____ (U)

( ) Ref:

1. ( ) GENERAL

Airspace coordination areas are safety measures for friendly aircraft. The airspace coordination area establishes an airspace that is reasonably safe from friendly surface delivered fires.

2. ( ) CONCEPT

Define the conceptual use of the airspace coordination area in this operation.

3. ( ) CONDUCT

a. Establishment.--Define the authority, means, and method for establishing the airspace coordination area.

(1) Authority.--Who will establish, who will advise.

(2) Means.--They will be put into effect and disseminated by (normally the FSCC).

(3) Method.--Describe the method to be used to establish this safety measure. A helicopter lane may become incorporated as an airspace coordination area when in use. However, the size will have to be enlarged if the operational concept includes fixed-wing aircraft as escorts for the helicopter assault aircraft. In all cases, the methods must provide for ease of identification by the pilots in the cockpit enabling them to stay within or outside of the prescribed area. For airspace coordination areas, entry, and exit considerations must be taken into account on the part of the planners.

b. Control.--The agency controlling the affected areas (normally the same as that agency used as the means for establishing them) must be given (or give) guidance as to the times the prescribed restrictions are affective, and how this will be incorporated into the air operations of landing force aviation.

c. Coordination.--The details of coordination between concerned agencies and those agencies and the aircraft, artillery, NGF, and other affected fire support means must be delineated.

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4. ( ) ADMINISTRATION AND LOGISTICS

a. Administration

b. Logistics

5. ( ) COMMAND AND SIGNAL

a. Command

b. Signal

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APPENDIX 4 (Interdiction and Armed Reconnaissance) to ANNEX M (Air Operations) to OPLAN _____ (U)

( ) Ref: As appropriate

1. INTERDICTION

In keeping with the purpose and concept of interdiction, a plan is likely to be formulated which will employ the deep strike capability of aircraft. Rail lines, roads, bridges, or any of the lines of communication which connect the AOA with potential supply areas will probably need to be interdicted. Assignments of aircraft and armament will be in response to the target and perhaps its location, and can only be determined when the specifics of a situation are known. Tab A of this appendix is an interdiction point overlay, showing the targets and routes to be flown as well as any useful information which the pilot may need to know.

2. ARMED RECONNAISSANCE

The purpose of aerial armed reconnaissance is to locate and attack targets of opportunity in assigned general areas or along communication routes. As a side effect, however, useful intelligence can be obtained from the aircrews who fly these missions. Since overall operational plans often stipulate the employment of armed reconnaissance missions, the planners will need to know how to construct an armed reconnaissance route overlay, an example of which is provided in Tab B of this appendix.

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TAB A (Interdiction Overlay) to APPENDIX 4 (Interdiction and Armed Reconnaissance) to ANNEX M (Air Operations) to OPLAN _____ (U)

( ) Ref: As appropriate

1. This paragraph and any subsequent subparagraphs will contain a brief discussion of the interdiction mission to be flown as well as introduce and describe the interdiction overlay which will be attached. The overlay itself will show routes to be flown, points of interdiction, the location of any friendly forces--the area, and the location of any known potential threats to the aircraft and crew.

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TAB B (Armed Reconnaissance Route Overlay) to APPENDIX 4 (Interdiction and Armed Reconnaissance) to ANNEX M (Air Operations) to OPLAN ______ (U)

( ) Ref: As appropriate

1. This and any necessary subsequent paragraphs will contain a brief discussion of the armed reconnaissance mission to be flown as well as an introduction and description of the armed reconnaissance route overlay which will be attached. The overlay itself will show the routes to be flow, the targets which the aircrew might expect to encounter, the position(s) of any friendly forces, the area, and the location of any known potential threat to the aircraft/aircrew.

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APPENDIX C

TYPICAL FRAGMENTARY ORDER

Section I.--ATTACK FRAGMENTARY ORDER FORMAT

1. ( ) UNIT ASSIGNED MISSION; EVENT/MISSION NUMBER
   a. Target. (Target numbers found in Appendix 4 to Annex B.)
   b. Number and type of aircraft.
   c. Ordnance load and fuzing. (Codes found in Appendix 6 to Annex M.
   d. Time on target/station.
   e. Reference and orbit. (Found in Tab B to Appendix 14 to Annex M.)
   f. Communications. (Frequency codes found in Tab A to Appendix 8 to Annex M, Control Agencies Designated.)
   g. Coordinating instructions.
2. ( ) UNIT ASSIGNED MISSION; EVENT/MISSION NUMBER
   a. Etc.

Section II.--SAMPLE FRAGMENTARY ORDER

FROM: CG, 4TH MAW
TO: 4TH MAW

SUBJ: AIR OPS 0100Z

REF: A. MY OPORD 101-68

1. MAG 41; EVENTS 43 A-G.
   - A. CAS ALERT.
   - B. 7 A4 FLTS OF 2 A/C.
   - C. LOAD: 1 A/C EACH FLT 4 C-4, 2 R-1.
   - D. TOS 0640-0750, 0750-0900, 0900-1010, 1230-1340, 1450-1600, 1600-1710, 1710-1820.
   - E. ORBIT 170° R/55 NM (DESIGNATED TACAN).
   - F. FREQ - BLUE/GREEN.
   - G. CONT BLUE BOY ONE.
2. MAG-42; EVENTS 53 A-D.
   - A. ETC.

APPENDIX D

JOINT AIR STRIKE MISSION DATA/REPORT

<table>
<tr><td colspan="6">JOINT AIR STRIKE MISSION DATA/REPORT
(Close Air Support/Air Interdiction)</td></tr>
<tr><td colspan="6">AIR STRIKE MISSION DATA</td></tr>
<tr><td>Flight Call Sign</td><td colspan="2">Mission Number</td><td colspan="2">No./Type A/C</td><td>Ordnance Load</td></tr>
<tr><td colspan="6">Flight Planning Data</td></tr>
<tr><td>TOT</td><td colspan="2">Orbit/RNDVS</td><td colspan="3" rowspan="3">Planned Airspace Coordination Area Number
Times
Locations
Width
Altitudes/VERTEX</td></tr>
<tr><td>Initial contact C/S</td><td>Pri</td><td>Sec</td></tr>
<tr><td>FAC/ASRT C/S</td><td>Pri</td><td>Sec</td></tr>
<tr><td colspan="2">*Target - Coordinates</td><td colspan="2">Elevation</td><td>*Alt Setting</td><td>Winds</td></tr>
<tr><td>Attack Heading</td><td colspan="3">Breakout</td><td colspan="2">Ordnance Sequence</td></tr>
<tr><td colspan="6">Target Information</td></tr>
<tr><td colspan="4">Friendly Positions</td><td colspan="2">Marking</td></tr>
<tr><td colspan="4"></td><td colspan="2">(ECM Pods ON/OFF Locations)</td></tr>
<tr><td colspan="6">* Not required for close air support missions.</td></tr>
</table>

JOINT AIR STRIKE REPORT

Control Agency (Call Sign)	This is (Call Sign)	Event/Mission	Mission No.

1	Target Identification/Location [A] (Number) [B] (Coordinates) [C] (Type)			
2	TOT/Time of Sighting [A] (On target) [B] (Off target)			
3	Results [A] Complete [B] Partial [C] None [D] Unknown [1] Destroyed [2] Neutralized [3] Covered [4] (Other			
4	Enemy Action [A] Ground [1] None [2] Light [3] Moderate [4] Heavy [5] (Type)			
	[B] Air [1] Number [2] (Type)			
5	Own Status [B] Damaged [D] Number [A] No Factor [C] Lost			
6	BINGO Time Is (Time)			
7	Ordnance Remaining Is [A] Number [B] Type			
8	Weather Is [A] Clear [B] Scattered [C] Broken [D] Overcast [1] 1-5 [2] 5-10 [3] 10-50 [4] 50-100			
9	Remarks		Date/Time Reported	Number

APPENDIX D

INSTRUCTIONS FOR USE OF JOINT AIR STRIKE MISSION DATA/REPORT FORM

JOINT AIR STRIKE MISSION DATA/REPORT FORM (FRONT)

The Joint Air Strike Mission Data/Report Form is needed for recording data necessary to accomplish the mission. The "Flight Planning Data" section may be used for flight lineup, fire control settings, BINGO fuel, and other data, as necessary. Appropriate portions of the form are used by the final control agency in briefing mission pilots; e.g., the forward air controller (FAC) uses the target information portion to brief those items in sequence. Those items used by the FAC may be extracted for printing on a FAC mission card providing the mission briefing data sequence is not altered and the Joint Air Strike Report Form is printed on the back of it.

INSTRUCTIONS FOR USE OF JOINT AIR STRIKE REPORT FORM (BACK)

Title and Element(s)	Explanation
Heading	Initiates communication contact.
Control Agency	Identifies control agency called.
This is	Identifies agency initiating call (e.g., FAC aircraft).
Event/Mission	Identifies specific mission by assigned number.
Mission No.	Assigns mission number.
Line 1. Target Identification/ Location	1. Identifies target actually taken under attack by: (use A or B and C).
A. Number	A. Target list number.
B. Coordinates	B. Military grid coordinates.
C. Type	C. Target type (e.g., vehicle, bridge).
Line 2. TOT/Time of Sighting	2. Time aircraft spent on target.
A. Number	A. Time aircraft commenced attack.
B. Off Target	B. Time aircraft ceased attack.
Line 3. Results	3. Describes actual target damage which is correlated with desired results to arrive at a decision for the initiation of subsequent actions. Elements are self-explanatory.
A. Complete	
B. Partial	
C. None	
D. Unknown	
(1) Destroyed	
(2) Neutralized	
(3) Covered	
(4) Other	

Title and Element(s)	Explanation
Line 4. Enemy Action was	4. Indicates the enemy response, ground and/or air which was encountered during the conduct of the mission. Used as an air intelligence input.
A. Ground	A. Enemy fire encountered from ground during the conduct of the mission.
(1) None	(1) Self-explanatory.
(2) Light	(2) Self-explanatory.
(3) Moderate	(3) Self-explanatory.
(4) Heavy	(4) Self-explanatory.
(5) Type	(5) Indicates type of fire encountered (e.g., small arms automatic weapons, AAA).
B. Air	B. Enemy aircraft sighted or encountered during the conduct of the mission.
(1) Number	(1) Self-explanatory.
(2) Type	(2) Indicates type aircraft sighted or encountered (e.g., MIG-21, BADGER, FISHBED).
Line 5. Own Status	5. Describes the present status of the mission with regard to enemy action encountered, used to initiate medical or rescue support.
A. No Factor	A. No damage.
B. Damaged	B. Indicates aircraft damaged by enemy ground/air fire. Aircraft flyable.
C. Lost	C. Aircraft downed by enemy ground/air fire.
D. Number	D. Indicates the number of aircraft damaged or lost.

Title and Element(s)	Explanation
Line 6. BINGO Time is	6. Defines the time at which the aircraft must depart the area to insure safe recovery. Used as a decision base for assignment to subsequent missions.
Line 7. Ordnance Remaining is	7. Indicates the usable ordnance remaining within the aircraft flight. Used as a decision base for assignment to subsequent missions.
A. Number	A. Indicates the total amount of ordnance available for secondary targets or subsequent missions.
B. Type	B. Indicates the type of ordnance remaining. Element may be coded if necessary.
Line 8. Weather is	8. Describes the basic weather in the target area.
A. Clear	A. No cloud cover.
B. Scattered	B. Less than 5/10 cloud cover.
C. Broken	C. Less than 5/10 to 9/10 cloud cover.
D. Overcast	D. 9/10 or more cloud cover.
For B, C, and D:	
(1) 1-5	(1) Height of clouds, AGL 100 to 500 feet.
(2) 5-10	(2) Height of clouds, AGL 500 to 1,000 feet.
(3) 10-50	(3) Height of clouds, AGL 1,000 to 5,000 feet.
(4) 50-100	(4) Height of clouds, AGL 5,000 to 10,000 feet.
Line 9. Remarks	9. Amplifying statements regarding the mission.
Date/Time Reported	Defines the date and time of report transmission.
Number	A serial number assigned by the receiving agency for record and administrative use.

APPENDIX E

MISSION REPORT

HEADING

PRECEDENCE

ORIGINATING AGENCY

ACTION ADDRESSEES

INFORMATION ADDRESSEES

SECURITY CLASSIFICATION/CODE WORD OR NICKNAME

MISREP (Number) DATE-TIME GROUP (GMT)/MONTH/YEAR

BODY

1. AIR TASK/MISSION NUMBER OR NICKNAME. Reference the request number, frag order number, or directive causing initiation of the mission.

2. LOCATION IDENTIFIER. Target number, line number, approved target designator/identifier, or coordinates of the target or sighting being reported.

3. TIME ON TARGET/TIME OF SIGHTING. Report all times by date-time group, using GMT unless otherwise directed.

4. RESULTS/SIGHTING INFORMATION. This item should contain the pilot/aircrew evaluation of expected results (e.g., percent destroyed, number and type destroyed, or percent of coverage) and concise narrative information on significant sightings (e.g., unusual or new enemy equipment or concentrations of enemy forces observed to include number, speed, and direction (if applicable)).

5. REMARKS. Includes information not specifically mentioned in above items (e.g., enemy defenses encountered, weather data, hostile meaconing, intrusion, jamming and interference (MIJI) attempts, etc).

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JCS Pub 2, Unified Action Armed Forces (UNAAF)

JCS Pub 8, Doctrine for Air Defense from Oversea Land Areas

JCS Pub 10, Tactical Command and Control and Communication Systems Standards (U)

JCS Pub 12, Tactical Command and Control Procedures for Joint Operations

2. LANDING FORCE MANUALS

LFM 01, Doctrine for Amphibious Operations

LFM 02, Doctrine for Landing Forces

LFM 04, Doctrine and Procedures for Airspace Control in the Combat Zone

3. FLEET MARINE FORCE MANUALS

FMFM 2-1, Intelligence

FMFM 3-1, Command and Staff Action

FMFM 3-2, Amphibious Training

FMFM 3-3, Helicopterborne Operations

FMFM 4-1, Logistics and Personnel Support

FMFM 4-2, Amphibious Embarkation

FMFM 4-3, Shore Party and Helicopter Support Team Operations

FMFM 5-1, Marine Aviation

FMFM 5-2 Series, Joint Munitions Effectiveness Manuals (U)

FMFM 5-3, Assault Support

FMFM 5-5, Antiair Warfare

FMFM 5-5C, Employment of the Forward Area Air Defense Battery (U)

FMFM 6-1, Marine Division

FMFM 6-2, Marine Infantry Regiment

FMFM 6-3, Marine Infantry Battalion

FMFM 7-1, Fire Support Coordination

FMFM 7-2, Naval Gunfire Support

FMFM 7-4, Field Artillery Support

FMFM 8-1, Special Operations

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FM 1-15, Aviation Company, Battalion, Group and Brigade
FM 1-100, Army Aviation Utilization
FM 101-5, Staff Officers' Field Manual: Staff Organization and Procedure

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AFM 2-2, Air Operations in Conjunction With the Amphibious Operations
AFM 2-7, Tactical Air Force Operations--Tactical Air Control System
TACM 1-1, Tactical Air Forces in Joint Operations
TACM 2-4, Tactical Air Control Party

7. MARINE CORPS ORDER

MCO 3120.3, The Organization of Marine Air-Ground Task Forces

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FMFM 5-5C

EMPLOYMENT OF FORWARD AREA AIR DEFENSE BATTERY

U. S. MARINE CORPS

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FOREWORD

1. PURPOSE

FMFM 5-5C, Employment of Forward Area Air Defense Battery, sets forth doctrine for employment and control of the FAAD battery and its subordinate units within the Marine Corps.

2. SCOPE

This manual is designed to provide information and guidance concerning the organization, mission, employment, command and control, and the support requirements of the FAAD battery and the weapon(s) it employs. This manual has purposely excluded classified information, available in other manuals, in order to facilitate distribution and use throughout the Marine Corps.

3. SUPERSESSION

FMFM 7-7, Employment of Forward Area Air Defense Battery (U)(C), dated 24 September 1968.

4. CHANGES

Recommendations for improving this manual are invited from commands as well as directly from individuals. The attached User Suggestion Form should be utilized by individuals and forwarded to the Commanding General, Marine Corps Development and Education Command (Director, Development Center), Quantico, Virginia 22134.

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5. CERTIFICATION

Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

JC Fegan

J. C. FEGAN
Lieutenant General, U.S. Marine Corps
Commanding General
Marine Corps Development and Education Command
Quantico, Virginia

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USER SUGGESTION FORM

From:
To: Commanding General, MCDEC
Development Center
Quantico, Virginia 22134

Subj: FMFM 5-5C; recommendation(s) concerning

1. In accordance with the Foreword to FMFM 5-5C, which invites individuals to submit suggestions concerning this FMFM directly to the above addressee, the following recommendation(s) is/are forwarded:

a. ITEM #1 (May be handwritten; if more space is required, use additional sheets and envelope.)

(1) Portion of the Manual: (Cite by paragraph and/or page number.)

(2) Comment: (Explain in sufficient detail to identify the points of the suggestion.)

(3) Recommendation: (State the exact wording desired to be inserted into the manual.)

b. Item #2

(1)

(2)

(3)

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RECORD OF CHANGES

Change Number	Date Entered	Entered By (Signature, Grade)

EMPLOYMENT OF FORWARD AREA AIR DEFENSE BATTERY

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CHAPTER 1

FORWARD AREA AIR DEFENSE EMPLOYMENT

Section I. INTRODUCTION

1101. GENERAL

The capability to conduct successful air defense operations is essential to the execution of an amphibious operation. As a portion of this capability, the Marine Corps employs a highly mobile guided missile system through the forward area air defense (FAAD) battery. The FAAD battery and the missile system are responsive to the needs of maneuvering combat elements and are capable of engaging and destroying low flying fixed- and rotary-wing aircraft and reconnaissance drones.

1102. MISSION

The mission of the FAAD battery is to provide close-in air defense protection in forward combat areas, defense of vital areas, and defense of units engaged in independent operations by destroying hostile air supported threats. It is particularly essential in areas not defended by other elements of the air defense system. As the FAAD component of the antiair warfare (AAW) system of the Marine aircraft wing (MAW), it performs the following tasks:

a. Provides for battery operation, to include the capability of rapid deployment ashore in an amphibious operation with integral command, control, and logistic support of the subordinate FAAD units.

b. Provides for the temporary deployment of separate FAAD units required to meet special tactical situations with required personnel and logistic support.

c. Plans and coordinates requirements for liaison and communications with appropriate commands to ensure the integration of FAAD unit operations with other air, ground, and AAW operations of the amphibious force.

d. Provides early warning of hostile air threats.

e. Conducts, supervises, and coordinates individual and unit training to qualify subordinate elements for tactical combat operations.

f. Performs first and second echelon maintenance of all organic equipment, excluding second echelon maintenance on weapons and trainers.

1103. HISTORY

a. Prior to the introduction of a lightweight shoulder-fired guided missile system, the caliber .50 machinegun was the best available AAW weapon to complete the umbrella of existing antiair defense (e.g., Nike Hercules, Hawk, etc.). However, with the introduction of high performance aircraft, the caliber .50 machinegun fell short of filling the gap of air defense against fast, low-flying air threats.

b. In June 1966, the Redeye Missile School was activated to train selected members of Fleet Marine Force (FMF) units in the operation and employment of the Redeye missile systems. The Redeye platoon was introduced into the FMF structure in September 1966 as part of each FMF division.

c. On 26 February 1969, an official table of organization (T/O) was effected for the FAAD battery, Marine air control group (MACG), MAW, FMF. The FAAD battery was placed in the MAW as a result of the decision to group all AAW assets under the command and control of the tactical air commander (TAC).

d. The missile system presently employed by the FAAD battery is an improved version of the Redeye system first introduced in the Marine Corps in 1966. Research and development continues to ensure that the latest weapon system is available for use by the FAAD gunner.

Section II. ORGANIZATION

1201. GENERAL

The FAAD battery is the primary unit within the MAW which provides close-in air defense protection for personnel and equipment in forward combat areas. The FAAD battery is organic to the MACG in the MAW. (See fig. 1.) When employed, it is task organized to provide air defense support for elements of the landing force in consonance with the overall air defense plan.

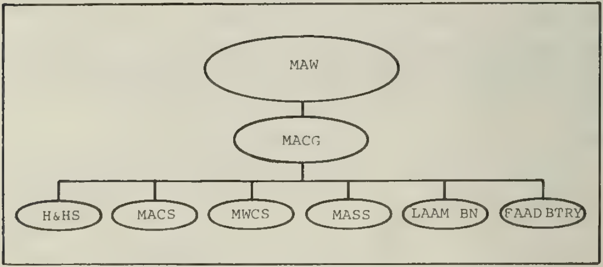


Figure 1.--FAAD Battery Attachment to Marine Aircraft Wing.

1202. FAAD BATTERY

The FAAD battery is normally considered adequate to support a Marine amphibious force. It consists of a battery headquarters, service platoon, and five FAAD platoons. (See fig. 2.)

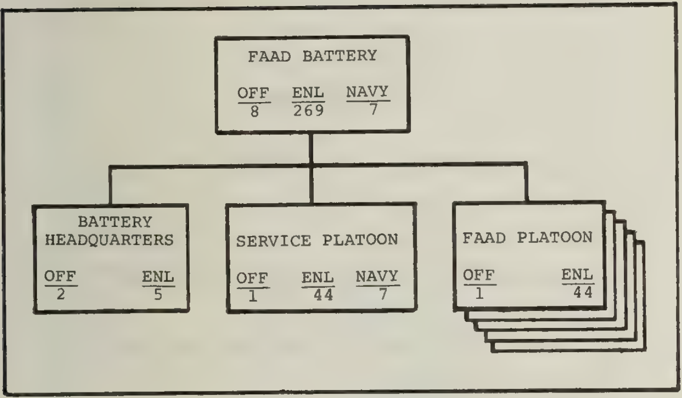


Figure 2.--FAAD Battery Organization.

a. Battery Headquarters.--The battery headquarters contains the command element and the battery administrative personnel.

b. Service Platoon.--The service platoon consists of a headquarters section, an operations section which incorporates the field radio operators and missile handlers, a maintenance section for motor transport support, and food service and medical sections. (See fig. 3.)

c. FAAD Platoon.--Normally, the FAAD platoon is considered adquate to support a Marine amphibious brigade (MAB). Each of the five platoons consists of a platoon commander, platoon sergeant, field radio operators, and three sections. (See fig. 4.)

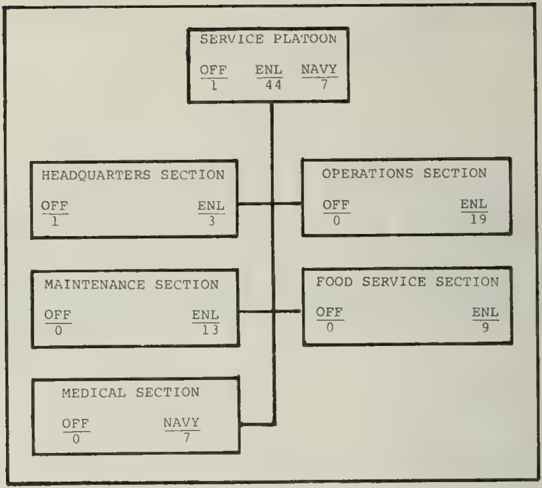


Figure 3.--Service Platoon.

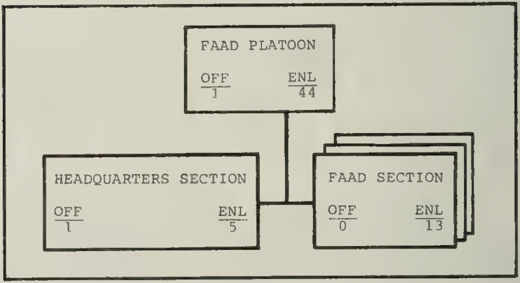


Figure 4.--FAAD Platoon.

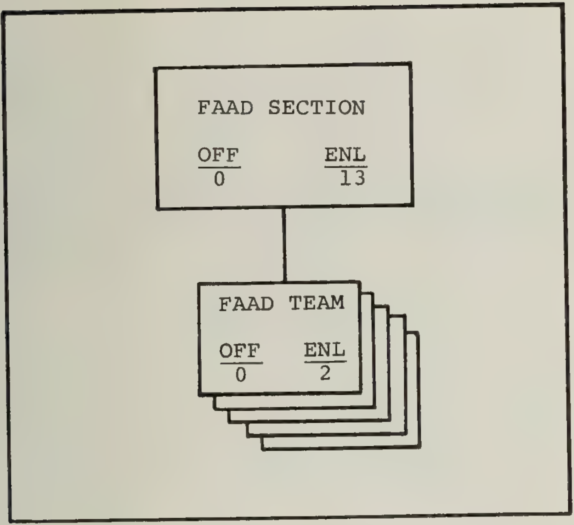


Figure 5.--FAAD Section.

(1) FAAD Section.--Normally, a FAAD section is considered adequate to support a Marine amphibious unit (MAU). When employed separately, an officer/SNCO will be placed in charge of the section. Each of the three sections consists of a section leader, two field radio operators, and five FAAD teams. (See fig. 5.)

(2) FAAD Team.--The basic operational fire unit of the FAAD battery is the FAAD team. It consists of a team leader/gunner and a motor vehicle operator/gunner.

1203. ADDITIONAL DUTY TEAMS

Selected personnel organic to the light antiaircraft missile (LAAM) battalion perform additional duty as FAAD gunners. Four teams are designated within each LAAM battalion. One team is normally designated in each of the missile batteries and one to the headquarters and service battery. Proficiency training is the responsibility of the LAAM battalion commander.

Section III. COMMAND, CONTROL, AND COMMUNICATIONS

1301. GENERAL

a. Air Control Coordination.--During amphibious operations, a single coordinated air control system is developed which is capable of controlling and coordinating all air operations within the amphibious objective area (AOA). Initially, this responsibility is vested in the commander amphibious task force (CATF). As the necessary facilities become operational ashore, responsibility for control and coordination is passed by increments to the commander landing force (CLF). Once command is passed ashore, the responsibility for the air control system is exercised by the tactical air command center (TACC).

b. Amphibious Task Force AAW Concept.--The AAW effort in the AOA integrates all available means into a single system that offers maximum control and protection, timely intelligence, and effective employment of resources. This is accomplished by exploiting the capabilities of each subsystem, integrating AAW early warning command and control capabilities, and achieving economy in use of weapon systems. The Marine air command and control system (MACCS) provides this capability ashore as shown in figure 6. Fighter and attack aircraft are the primary and longest range AAW weapons. They are complemented by the shorter range defensive weapons (Hawk and Redeye missiles).

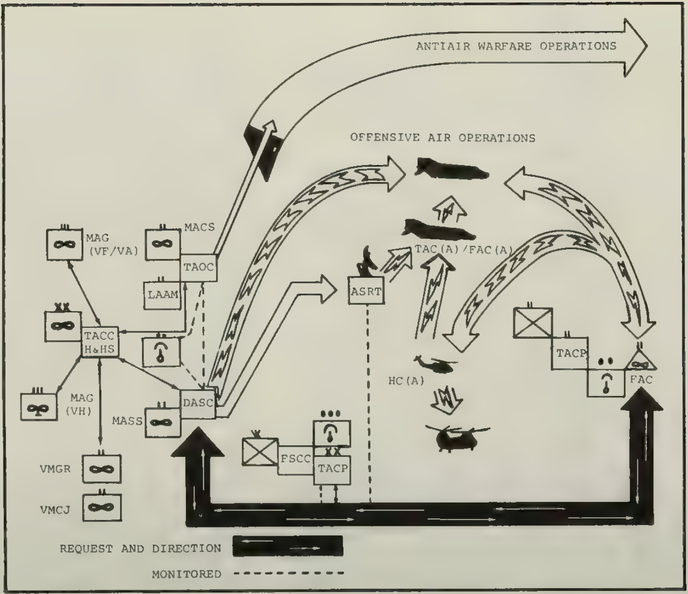


Figure 6.--Marine Air Command and Control System, Deployed.

Antiaircraft guns and surface-to-air missiles (SAM's) of the Navy contribute to the overall AAW system and provide protection to the amphibious task force.

c. FAAD Battery Integration.--During amphibious operations, AAW means must be projected ashore as early as possible. The mobility of FAAD battery weapons enable them to accompany the first elements of the landing force ashore. This flexibility enables an early integration into the overall air command and control system with FAAD units providing a balanced air defense throughout the combat area, complementing other elements of the air defense system.

d. FAAD Unit Assignments.--FAAD units are located with frontline elements to provide early AAW protection and then to cover those avenues of approach which are considered to be the most serious threat to the entire landing force. FAAD units are also assigned to protect vital areas and/or objectives in the AOA. In offensive situations, the teams are primarily responsive to the scheme of maneuver of the supported frontline units. In a defensive situation, the teams should complement each other and provide gap-fillers in the overall AAW defense.

1302. ORGANIZATION FOR COMBAT

a. In support of the landing, the FAAD units perform the following functions:

(1) Acquire, identify, engage, and destroy low-flying hostile aircraft.

(2) Coordinate with appropriate agencies to maintain friendly aircraft position information.

(3) Provide visual surveillance in assigned zones of fire.

(4) Provide an immediate reaction air defense capability in areas masked from other defense systems.

(5) Provide early warning of hostile air threats.

b. The tactical functions may be accomplished by organizing in the following manner:

(1) Support in a Static Situation.--Under these conditions, the FAAD unit deploys its subordinate elements to best defend the supported force. Emphasis is placed on maintenance of overlapping fires and on coverage of low altitude attack routes identified by the commander landing force as threatening the operation. The FAAD unit commander will maintain command and control of all deployed teams. Teams should coordinate with the nearest unit commander for purposes of team security and messing.

(2) Support in a Fluid Situation.--In this case, the FAAD units move with the supported elements as required for mission accomplishment, but otherwise remain under FAAD command and control. FAAD units depend on the supported unit for security and service support (rations, supply, etc.).

(3) Attached.--In order to maintain centralized control of all AAW assets in the AOA, FAAD units will not normally be detached from aviation command and control. However, if

a ground combat element is required to conduct independent operations such that control of FAAD units by the MACCS would not be feasible, then FAAD units may be attached. The command to which the FAAD unit is attached would exercise command and control subject to the specific guidance of the CLF.

(4) Responsibilities.--Appendix A amplifies responsibilities according to the situation.

(5) Reorganization.--As the air/ground combat situation changes, the FAAD units should be reorganized in a manner to best defend the AOA.

1303. FAAD COMMAND AND CONTROL

a. Marine Amphibious Force (MAF) Operations

(1) Command.--FAAD support for MAF level operations will be provided by the FAAD battery. Command of the battery is exercised through elements of the MACCS.

(2) Control Afloat.--During the early phase of an amphibious operation, control of air and AAW operations is vested in the CATF who exercises this responsibility through his tactical air officer. The FAAD battery commander, or his representative, will control FAAD units from the supporting arms coordination center (SACC). Weapons control conditions, air defense warning conditions, and antiair intelligence information will be received from the tactical air control center element of the SACC. FAAD platoon commanders will displace ashore with the supported units, maintaining communications with the battery commander, or his

representative, on the FAAD weapons control (FWC) net. The battery executive officer will displace the battery headquarters ashore with the landing force fire supoort coordination center (FSCC). While control of Redeye operations is afloat, the battery executive officer will function as FAAD liaison officer to the FSCC. In this capacity, he will monitor the FWC net and coordinate FAAD unit operations ashore.

(3) Control Ashore.--When the direct air support center (SASC) become operational ashore, the battery executive officer will move to the DASC, coordinating FAAD battery activities through this agency. Control of FAAD battery operations will continue to be exercised from the SACC through the CATF's AAW system until the tactical air command center (TACC) becomes operational ashore and control of AAW operations is passed to the CLF. When command is passed ashore, the battery commander will receive weapons control conditions, air warning conditions, and antiair intelligence information over the combat information/detection (CI/D) net and antiaircraft intelligence (AAI) net.

b. Marine Amphibious Brigade (MAB) Operations

(1) Command.--Support for an MAB level operation will be provided by the FAAD platoon. Command of the platoon is exercised through the MACCS.

(2) Control Afloat.--The FAAD platoon commander or his representative will control FAAD units from the SACC. Weapons control conditions, air defense warning conditions, and antiair intelligence information will be

received from the SACC. FAAD section leaders will displace ashore with the FSCC's of the supported units remaining communications with the platoon commander or his representative in the SACC over the FWC net. Normally, the platoon sergeant will displace ashore with the landing force FSCC. Functioning as the FAAD liaison to the FSCC, he will monitor the FWC net and coordinate FAAD unit operations ashore.

(3) Control Ashore.--When control of AAW is passed ashore to the CLF, the FAAD unit headquarters should be located in that MACCS agency which can best provide rapid early warning information and weapons control conditions. Selection of the agency which can best provide that information must be based on the tactical situation. Prime considerations are the availability of satisfactory communications, command, and control information from the TACC and the friendly air picture. Facilities will differ depending upon the tactical situation and the size of the operation (MAF, MAB, MAU). It is crucial that the FAAD headquarters maintain an awareness of the total AAW situation. When command is passed ashore, the battery commander will receive weapon control conditions, air warning conditions, and antiair intelligence information over the combat information/detection (CI/D) net and antiaircraft intelligence (AAI) net.

c. Marine Amphibious Unit (MAU) Operations

(1) Command.--Support for an MAU level operation will be provided by FAAD section(s). Command of the section(s) is exercised through the MACCS if available.

(2) Control Afloat.--The OIC/NCOIC of the FAAD section(s) will control the section(s) from the SACC. The assistant OIC/NCOIC (section leader) will displace ashore with the landing force FSCC maintaining communications with the FAAD OIC/NCOIC in the SACC over the FWC net. The assistant OIC/NCOIC acts as FAAD liaison officer to the FSCC and relays weapons control conditions, air defense warning conditions, and antiair intelligence information to the FAAD teams ashore over the FAAD team control (FTC) net.

(3) Control Ashore.--Normally for operations at the MAU level, control of air and AAW operations in the AOA remains with the CATF. If control of AAW operations is passed to the CLF, control of FAAD weapons will be exercised through the appropriate MACCS agency (TAOC or DASC).

1304. WEAPONS CONTROL AND COORDINATION

a. General.--The MACCS has the assets and the flexibility to coordinate and choose AAW weapons as the situation dictates. Air defense warnings and weapons control conditions are established by the CATF/CLF and disseminated over the MACCS communication nets. Local situations may allow subordinate unit commanders to impose restrictive weapons control conditions.

(1) FAAD Coordination.--The FAAD teams and command elements of the FAAD battery require considerable coordination for effective employment. The FAAD commander maintains current position and status information on all teams and disseminates weapons control conditions. The FAAD commander must be kept informed

of location and composition of detected or pending raids, engagements results, local air defense alert conditions, the status and location of "safe flight corridors," and the firing capabilities of LAAM battalion fire units. The FAAD commander provides information on friendly and hostile aircraft activity and engagement results to appropriate MACCS agencies.

(2) Fire Direction.--Fire direction of FAAD units includes target assignment and its relationship to zones of fire. The fire direction is the responsibility of the TAOC exercised through the FAAD commander for the FAAD teams. Firing coordination among LAAM and FAAD units is essential. The TAOC considers zones of fire, early warning, and target assignment when coordinating the fire of LAAM and FAAD units. For a detailed discussion of fire direction coordination for all AAW assets, see FMFM 5-1, Marine Aviation.

b. Air Defense Warnings.--The CATF or CLF evaluates the probability of air attacks and issues air defense warnings. The warnings are promulgated by the SACC or TACC. Air defense warnings are defined as follows:

(1) RED: Attack is imminent or in progress.
(2) YELLOW: Attack is probable.
(3) WHITE: Attack is not probable.

c. Weapons Control Conditions

(1) Weapons Free.--This command means fire may be opened on all aircraft, except helicopters, not recognized as friendly. FAAD gunners may engage high speed aircraft not

positively identified as friendly. Engagement of helicopters requires positive identification.

(2) Weapons Tight.--The command means do not open fire, or to cease firing on any aircraft (or on bogey specified, or in section indicated) unless target(s) known to be hostile. FAAD gunners may engage any aircraft positively identified as hostile.

(3) Hold Fire.--This command means do not open fire or to cease firing on raid/track designated. FAAD gunners do not fire unless directly under attack by aircraft.

(4) Resume Fire.--This command is given to terminate the "hold fire" restriction.

(5) Cease Fire.--This command is normally given to air defense artillery units to refrain from firing on, but to continue to track visually, an airborne object.

(6) Cease Engagement.--This is an order for weapons to disengage a particular target or targets and prepare to engage another target. The order terminates engagement on a particular target.

d. Detection/Identification of Aircraft. --Coordinated measures which help provide timely identification include information from visual, radar and identification friend or foe (IFF), flight plans, air corridors, flight characteristics, and the actions of observed aircraft.

(1) Friendly Aircraft

(a) Recognized as a friendly.

(b) Aircraft in a friendly corridor not committing a hostile act.

(c) Designated by control agency.

(d) Unidentified and not committing a hostile act.

(2) Hostile Aircraft

(a) Recognized as an enemy.

(b) Unidentified and attacking friendly installations.

(c) Unidentified in areas where control agencies have specified all aircraft will be engaged.

e. Loss of Communications.--In the event of loss of communications, FAAD units are to go to "weapons tight" condition. If the previous condition was "weapons free," the "weapons tight" condition is assumed immediately. If prior to communication loss, the weapon was in "hold fire" status, FAAD units will maintain "hold fire" for a period of 10 minutes and then assume "weapons tight." Loss of communication procedures should be instituted if the FWC and/or FTC communication nets are down.

f. Authority to Change Control Conditions.--Authority to change the FAAD weapons control conditions is vested in the commander landing force and is normally exercised by the tactical air commander through the TACC. In independent operations, this authority is vested in the senior organizational commander. It is anticipated that the normal weapons control condition will be "weapons tight" and that changes will be infrequent. It is possible that the tactical situation may require a momentary change in the weapons control condition status within a local commander's area. The following criteria will apply:

(1) Area Control Agency.--In either a "weapons free" or "weapons tight" status, the approximate MACCS control agency may direct

"hold fire" when appropriate or may direct engagement of targets.

(2) Local Tactical Commander.--Organizational commanders to which FAAD teams are attached may, when the tactical situation requires, set weapons control conditions for their local area which imposes additional restraints on the FAAD gunner.

1305. STANDING OPERATING PROCEDURES (SOP'S)

SOP's will cover, but not be limited to, the following:

a. An operational log should be maintained by each FAAD detachment from the section to battery level. This log will contain a chronological record of events pertaining to the unit's operation.

b. Action reports should be submitted as directed via the FAAD unit chain of command. These reports will cover a specified period of time and be consolidated at each echelon and forwarded to the next higher command to arrive at a time to be designated in the operation order. Typical information would include enemy sightings, engagements, helicopters, and kills.

1306. COMMUNICATIONS

The destructive capabilities of the lightweight air defense weapon system employed by the FAAD battery combined with the predicted density of friendly aircraft overflying the AOA dictate that absolute control be exercised over the use of FAAD weapons. Due to the wide dispersion and mobility of FAAD battery elements throughout the AOA, radio is the primary means of satisfying these control requirements. Wire should be used in a static situation. The communications of the FAAD battery in the MACCS are shown in figure 7.

a. Responsibility.--The FAAD battery commander is responsible for battery communications. He will ensure that:

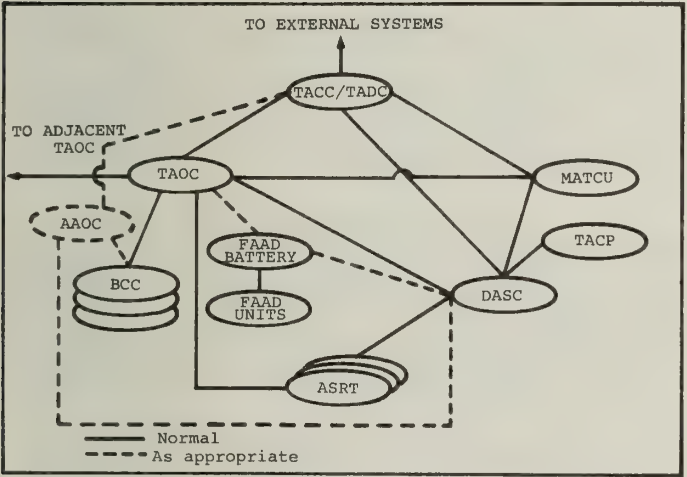


Figure 7.--Communications of the FAAD Battery in the Marine Air Command and Control System.

(1) The establishment, maintenance, control, coordination, and employment of communications is in accordance with current doctrine and applicable directives issued by higher authority by preparing and promulgating specific methods and procedures.

(2) All personnel required to operate telecommunication equipment are qualified by establishing an organized training program.

(3) Alternate communication means, as available and required, are used for effective communication support of battery operations.

b. FAAD Battery Communication System.--In order for air defense warnings, weapon control conditions, and pertinent information concerning friendly, enemy, or unknown aircraft as well as necessary FAAD battery command information to be exchanged, the following communication nets may be required:

(1) FAAD Weapon Control (FWC) Net (HF).--The FWC net is established by the senior FAAD representative in the SACC or the appropriate MACCS agency. Multiple nets may be required. This net provides subordinate units with current air defense warnings, weapons control conditions, and pertinent information concerning friendly, enemy, or unidentified aircraft. The following stations are on this net:

(a) FAAD battery commander (SACC/appropriate MACCS agency).

(b) FAAD platoon commander(s) (regimental FSCC or appropriate MACCS agency).

(c) FAAD section leaders (battalion FSCC).

(2) FAAD Team Control (FTC) Net (VHF).--The FTC net is established by the section leader

normally located in the FSCC of the supported unit. Multiple nets may be required. This net is used by the section leader to control FAAD teams and relay air defense warnings, weapons control conditions, and pertinent information concerning friendly, enemy, or unidentified aircraft. The following stations are on this net:

(a) FAAD section leaders (battalion FSCC).

(b) FAAD teams.

(3) Activation.--These communication nets would be activated when FAAD teams are deployed in support of infantry units. FAAD teams assigned to support other units have similar requirements. In each employment, specific coordination will be effected to ensure communication requirements are satisfied and any unique problems of FAAD support in that given environment are considered. Careful communication planning and detailed coordination are prerequisites to effective control.

c. Alternate Communication Means.--In the case of loss of communications, FAAD unit leaders and FAAD teams should attempt to utilize FSCC communication nets. The FSCC controls communication nets for coordination of all supporting arms. Landing force representatives in the SACC (air, naval gunfire, and artillery) have established nets with the FSCC for control of supporting arms that parallel the FWC net. The air liaison officer in the FSCC is in contact with the DASC when it is established ashore. Redeye unit leaders in the FSCC could establish communications with Redeye teams supporting company and/or battery level units on such nets as the TACP local, shore fire control party (SFCP) local, and artillery conduct of fire communication nets utilized by the FAC and NGF spot teams.

d. Supplemental Communications

(1) The manner in which elements of the FAAD battery are employed may require the use of other communication means. Both visual and sound systems may be developed and employed as necessary. They are coordinated and published in applicable communication standing operating procedures/annexes to operation plans prior to use.

(2) If other communication means are not available or operating, the arm-and-hand signals shown in figure 8 may be used.

e. FAAD Additional Duty Teams.--These teams have control requirements similar to FAAD battery teams. They are always employed within the parent LAAM battalion and are controlled through the antiair operation center (AAOC). This is accomplished by using existing communication nets to the AAOC and the battery control central (BCC) in the missile batteries and by wire from the BCC to the associated FAAD team. The FAAD team from the headquarters and service battery should be linked directly with the AAOC by wire.

f. Communications Security.--Communications security (COMSEC) results from all measures designed to deny unauthorized persons information which might be derived from the possession and study of communications. COMSEC includes physical, cryptographic, and transmission security. Maximum use will be made of COMSEC capabilities and assets.

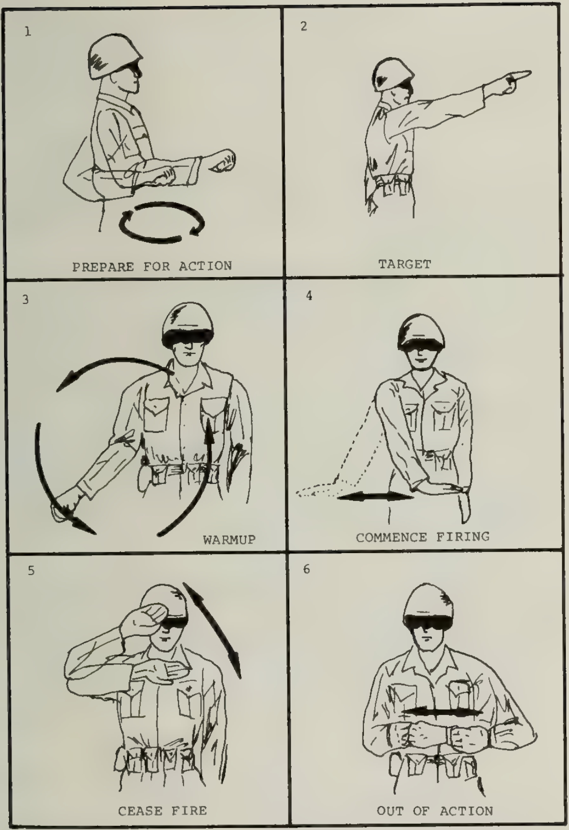


Figure 8.--Arm-and-Hand Signals Used With FAAD Teams.

(1) Physical Security.--Physical security is that part of COMSEC concerned with all physical measures necessary to prevent unauthorized access to equipment, information, and documents, and to safeguard them against espionage, sabotage, loss, damage, and theft.

(2) Crypto Security.--Crypto security is the element of COMSEC which deals with the provision of technically sound cryptographic systems and the proper use of authorized codes and cipher devices.

(3) Transmission Security

(a) Transmission security is that component of COMSEC which includes all measures designed to protect transmissions from unauthorized interception and exploitation.

(b) Strict circuit discipline and adherence to authorized procedures are the primary means which provide transmission security over radio circuts. All personnel who operate radios must be trained to recognize and avoid improper practices which endanger radio transmission security. This includes violation of radio silence, unofficial conversation between operators, use of plain language in place of applicable prosigns or operating signals, and failure to maintain radio watches on designated frequencies and at prescribed times.

Section IV. EMPLOYMENT

1401. GENERAL

FAAD battery units are task organized to provide close-in air defense to the landing force in consonance with the overall AAW plan. Teams are located with frontline elements in order to provide their air defense. In addition to being employed to provide protection for maneuver elements, FAAD units are assigned to protect vital areas when no other ground-based air defense means are available, a situation likely to exist in early phases of amphibious operations. In offensive situations, the teams are primarily responsive to the scheme of maneuver of the frontline unit. In a defensive situation, the teams should complement each other and fill gaps in the overall AAW plan.

1402. EMPLOYMENT CONSIDERATIONS

a. FAAD Planning.--Planning is the responsibility of the CATF afloat and of the CLF ashore. Planning should include, but not be limited to, the following factors:

(1) The air threat, to include air delivery methods and tactics.
(2) Mission and disposition of the defended unit(s)/installation(s) and commander's guidance.
(3) Elements or installations to be defended in order of priority.

(4) The ground threat.

(5) FAAD capabilities and limitations.

(6) Availability of firing and alternate firing positions.

(7) Command and control criteria.

(8) Location and coverage of other air defense means.

(9) Disposition/control procedures while embarked.

b. Intelligence Briefings.--Intelligence briefings covering disposition of friendly and enemy forces, the enemy air threat, likely avenues of approach to the AOA for fixed and rotary wing aircraft, enemy tactical air doctrine, general terrain, and weather will enhance the FAAD team's ability to perform its mission. This information should be provided to the FAAD unit commander prior to any tactical operation and updated regularly over the appropriate FAAD or alternate net.

c. Offensive Operations.--During offensive operations, FAAD units are most frequently employed in direct support of the maneuver and reserve tactical elements or headquarters and support areas. When in support of the maneuver elements, FAAD units must maintain mobility to allow for repeated displacement to sites best suited for AAW support.

(1) Preparation for the Attack.--Map and ground reconnaissance should be made with particular attention given to selection of firing positions and low level aircraft

approach corridors along the planned route of advance. Radio frequencies must be known by all unit members and keying material for secure voice equipment must be on hand. Procedures must be established for resupply of FAAD weapons.

(2) Motor Convoys.--In a column, FAAD units should be placed both at the front and the rear of the column, with prime consideration given to early and continuous engagement of the air threat along the axis of the column's movement. FAAD unit members must have their weapons unpacked and ready to fire. They must be prepared to dismount, assume the best available firing positions, and engage the air threat on short notice without violating safety criteria. The commander may choose to place units at critical points along the route of the column to ensure the necessary observation and coverage. Locations such as bridges, defiles, and passes, where an air attack could halt the entire column, are considered critical points.

(3) Dismounted Operations.--The FAAD unit normally dismounts to defend maneuver elements in difficult terrain and in the assault. The two team members are most effective operating as a team. The basic load for the FAAD team consists of four weapons in monopaks, a secure voice radio, and the normal T/O weapon and pack. The supported unit must be prepared to provide security for FAAD equipment left in the rear and to assist in carrying the team's basic load of FAAD weapons. Without assistance, the FAAD team is limited to two weapons as the weight of the FAAD team's load places physical limitations on their range and mobility during dismounted operations.

The unit should cover the final assault from preselected positions offering the best chance for FAAD defense and survivability.

d. Defensive Operations.--Defensive operations usually allow a greater degree of control and coordination of FAAD support and the selection of optimum firing positions. The FAAD unit will normally occupy prominent terrain overlooking the supported unit's defensive position and should be retracted at night if its position is outside the supported unit's perimeter.

(1) Mutually Supporting Fires.--Mutually supporting fires are desirable and enhance the probability of a kill. Quite frequently, mutual support will not be achieved due to the disposition of the supported unit and terrain features. FAAD units must be positioned to provide mutual support to the maximum extent possible, but not at the expense of the tactical disposition of units or the site selection criteria covered above.

(2) Integration into the AAW Plan.--During a static situation, the FAAD unit may be assigned to a gap filler role and specific firing sites by the CLF. The FAAD unit should continue to draw normal logistic support from the supported unit.

e. Tactical Firing Site Selection.--FAAD unit firing positions must be the best available sites for the accomplishment of the mission. Since the FAAD weapon's backblast is easily identifiable, other available firing positions should be designated as alternate positions to allow rapid displacement after firing. The location of firing positions should be coordinated by the senior FAAD commander with the air defense control agency and the local tactical commander. The initial selection of firing positions will be by map reconnaissance followed by ground/aerial reconnaissance when time, transportation, and the tactical situation permit.

(1) Observation.--FAAD units use visual means for detection and recognition of targets. Surveillance is maintained in all directions with emphasis on the most likely direction of attack. FAAD positions should be selected to allow detection of low-flying aircraft at ranges consistent with the optimum capability of the weapon. One team member continuously performs surveillance of the surrounding air space, alternating with the other member as required. They may be separated by short distances where observation is limited.

(2) Fields of Fire.--The gunner must have good fields of fire along the most probable routes of approach of hostile aircraft. The FAAD unit leader selects a firing position which minimizes the effect of vegetation and terrain mask, allows engagement of low-flying aircraft at the optimum ranges of the weapon, and minimizes direct or reflective effects of the sun.

(3) Accessibility.--Although not a primary consideration, the FAAD firing site should be readily accessible by the unit's organic vehicle to maintain mobility and facilitate supply.

(4) Cover and Concealment.--In

selecting firing positions, consideration must be given to cover and concealment. The position should provide natural cover which enhances the ability to camouflage the position. If natural cover is not available, foxholes or bunkers should be prepared to provide protection from enemy fire. In camouflaging the position, consideration should be given to visibility from the air as well as from enemy ground observation.

(5) Safety.--Missile backblast requires that the FAAD weapon be fired from an open position and that gunner positions should be clear of excessive dry brush, tall grass, or other materials which might ignite when the weapon is fired. A circular zone around the firing position should be kept clear to permit the team to fire in all directions.

1403. LEVEL OF EMPLOYMENT

MAF, MAB, and MAU operations are normally supported by FAAD batteries, FAAD platoons and FAAD sections respectively. However, the degree of FAAD support assigned to the landing force must be assessed during the planning phase based on the planning and operational considerations discussed in this section. In addition to being tasked with protection of ground combat elements, FAAD units may be assigned to command, combat support, or service support elements to provide protection to vital areas, such as command posts, logistic support areas, communication installations, and air facilities.

1404. NIGHT EMPLOYMENT

The Redeye weapon has a night tracking and kill capability which is equal to or superior to that in daytime. However, the total weapon system is dependent on the gunner's visual aircraft identification, target acquisition and IR lock, and range estimation. As a result, the FAAD weapon will not normally be employed at night.

1405. TRAINING

a. Identification.--Protection of friendly aircraft requires that positive visual identification be made prior to FAAD engagement. Identification training must include:

(1) A vigorous aircraft recognition program (initial and continuing).
(2) Frequent exercises (both integrated Mablex/Maulex and local tracking drills).
(3) Implementation of early warning via MACCS.
(4) Recognition of friendly/hostile aircraft action.
(5) Exercise of weapons control conditions.
(6) Use of friendly aircraft flight information (DASC and TAOC).
(7) Use of friendly aircraft corridors.

b. Weapon Handling and Firing

(1) General.--The FAAD gunner must

be proficient in handling his weapon, utilizing it to engage an aircraft, and firing procedures. A training program can be conducted in a classroom which will enable gunners to:

(a) Receive, inspect, transport, and protect the weapon.

(b) Perform preventive maintenance.

(c) Prepare the weapon for firing.

(d) Conduct a successful engagement.

(2) Tracking Drills.--Tracking drills should be conducted regularly on the initiative of the platoon commander. Site(s) should be identified which present realistic flight profiles in terms of ordnance delivery techniques. The tracking head trainer and the Redeye launch simulator (RELS) should be used to enhance sequence of engagement training.

(3) Annual Requalification.--It is essential that the FAAD platoon commander monitor the requalification of assigned gunners and plan firing exercises to maintain qualifications in accordance with current directives.

c. Tactical Employment and Control.--A comprehensive knowledge of tactical employment, field operations, and control procedures must be learned by the FAAD gunner. This knowledge encompasses:

(1) Principles and functioning of the weapon.

(2) Capabilities and limitations.

(3) Safety precautions.

(4) Aircraft recognition of U.S., Allied, and enemy aircraft.

(5) IR signature characteristics for typical aircraft.

(6) Rules of engagement.

(7) Weapons control conditions.

(8) Air defense warnings.

(9) FAAD communication system procedures.

(10) Surveillance techniques.

(11) Firing doctrine.

(12) Map reading and principles of site selection.

(13) Assigned communication equipment and communication security.

(14) Methods of weapon destruction.

(15) Required reports.

d. Physical Conditioning.--In dismounted operations, FAAD units are required to deploy with FAAD weapons, radios, normal T/O weapons, and field pack. A vigorous physical conditioning program will ensure that FAAD teams are capable of performing effectively in this role.

e. Evaluation.--Formal testing, using procedures established at the battery level, should be accomplished periodically in aircraft identification, using the Ground Observer Aerial Recognition (GOAR) kit and other training devices. Additionally, handling and firing procedures should be evaluated in a formal manner. The overall effectiveness of the FAAD training program is best evaluated by participation in integrated field exercises under the observation of qualified umpires. Appendix C is a sample umpire's checklist.

1406. SECURITY CONSIDERATIONS

Adequate security for the FAAD unit is important to prevent compromise and hostile use of the weapon. While selection of positions for the FAAD unit is the responsibility of the FAAD unit leader, local security for the FAAD unit is the responsibility of the commander of the supported unit and should not detract from the supported unit's mission. Accordingly, FAAD unit leaders must coordinate with the supported unit commander in selecting firing positions and evaluating enemy capabilities for attack. If enemy ground attack is expected, the positions should be located well within the perimeter of the supported unit.

1407. FAAD ANTIAIR WARFARE PLANNING

Antiair warfare is defined as operations conducted against aircraft and/or missiles, their supporting forces, and operating bases. Antiair warfare comprises all measures, both active and passive, employed in achieving and maintaining air superiority. Since antiair warfare is an integral part of the overall amphibious operation, planning and execution of this effort is closely coordinated with all other operations in the objective area. It is possible that the FAAD detachment might be the only antiair warfare system employed in an operation, but it is more likely that the Redeye weapon will be just one part of the antiair warfare commitment. In either case, the concept of operations for antiair warfare (to include FAAD unit operations) will normally be expressed in the antiair warfare annex to the operation order. Its format generally follows the standard five-paragraph form (see FMFM 3-1, Command and Staff Action).

Section V. ADMINISTRATION AND LOGISTICS

1501. ADMINISTRATION

a. Garrison.--In garrison, the FAAD unit is under the administrative and operational control of the MACG. The FAAD unit may be assigned to a subordinate unit of the MACG.

b. Direct/General Support.--When employed in direct or general support, administrative and operational control of FAAD units remains with the aviation combat element.

c. Attachment.--When attached to a ground combat element, administrative and operational control is transferred to the combat element.

1502. LOGISTICS

a. General.--The principles and procedures of logistic support for FAAD units are similar to those of other FMF organizations. The FAAD battery is capable of providing most of the normal support functions such as maintenance, supply, food service, and medical. However, due to the requirement to deploy separate platoons/sections and the dispersion of FAAD teams necessary to support maneuver elements, FAAD units/teams must often rely on the supported unit for a major share of logistic support.

(1) Authorized Allowances.--Instructions and guidance which will assist a commander in computing materiel requirements for the performance of assigned missions will be found in the Table of Authorized Materiel (TAM). Logistic planning data are included for classes I and III, as well as guidance relative to type 3 (Special Measures of Control) items within classes II, IV, and VII. General instructions in the TAM provide pertinent information which includes applicable allowance publications.

(2) Responsibilities of Commanding Officers.--The FAAD unit Table of Equipment specifies authorized allowances for the FAAD unit and includes additional instructions regarding the responsibilities of the commanding officer.

b. Logistic Support

(1) Supply

(a) General.--The FAAD battery has a limited capability for organic supply. All technical manuals and repair parts lists prepared by the U.S. Army will be used by the FAAD battery. The battery commander will coordinate the supply requirements for subordinate elements. Platoons and sections deployed separately must rely on supply support from the unit to which administratively assigned or from the supported unit.

(b) FAAD Weapon.--The basic load of the FAAD team is four weapons. Resupply follows normal class V procedures and is the responsibility of the FAAD unit commander.

(2) Equipment.--A technical description of the Redeye system is contained

in section VI. The major items of equipment, other support equipment, and tools unique to the Redeye weapon system are as follows:

(a) Guided Missile System, Intercept-Aerial: M41E2 (Redeye). One Redeye weapon and three battery/coolant units are loaded, transported, and stored in the shipping and storage container (Monopak). Once the weapon has been fired, the launcher will be recovered if the tactical situation permits. Expended launcher tubes will be returned to the ammunition supply point.

(b) Test Set, Guided Missile System AN/TSM-82: Guided Missile Test Set.

(c) Training Set, Guided Missile System, M76 (Redeye).

(d) Redeye Launch Simulator (RELS).

(e) Guided Missile, Intercept-Aerial Training, M46A2 (Redeye).

(f) Shipping and Storage Container, Guided Missile System: M571 (Monopak) (Redeye).

(3) Maintenance.--The FAAD battery is capable of organizational maintenance for assigned motor transport and communications equipment. Platoons and sections deployed separately must rely on maintenance support from the unit to which administratively assigned. The maintenance plan for the Redeye weapon system assumes a high degree of reliability for the system. Maintenance functions are delegated to the lowest organizational level commensurate with tools, skills, and time available.

(a) Organizational maintenance on the Redeye weapon, the guided missile test set, the tracking head trainer, the field handling trainer, and Redeye launch simulator is limited to replacement of parts which do not require tools, inspection, cleaning and replacement of batteries, and protecting and cleaning the exterior surfaces of all units.

(b) Intermediate maintenance is not permitted on any weapon, training or test unit.

(c) Depot maintenance on the Redeye weapon will be performed at designated U.S. Army Depots. It will be performed on the guided missile test set and tracking head trainer at the calibration facility of the Marine Corps Supply Centers. Depot maintenance on the Redeye launch simulator will be performed as directed by Headquarters Marine Corps.

CHAPTER 2

WEAPON SYSTEM

Section I. DESCRIPTION

2101. GENERAL

The Redeye missile is an infrared seeking, passive homing missile. The missile responds to radiation in the infrared frequency spectrum and uses this radiation to guide itself to the target.

a. Nature of Infrared Radiation (IR).--Infrared radiation is radiation of electromagnetic energy in the frequency spectrum beginning just above that of red visible light. All substances in nature radiate infrared energy. The amount and character of IR radiation depends on the temperature of the substance. IR energy has properties similar to light energy, traveling in a straight line and at the same speed as light (approximately 186,000 miles per second).

b. Redeye Infrared Seeker.--The Redeye seeker acquires the IR energy emitted by a target and signals the gunner by an audible signal produced by the weapon, tracking head trainer, and RELS. The seeker is designed to detect IR radiation in the frequency spectrum emitted by hot metal parts associated with aircraft exhaust and tailpipes. The IR detector is made more sensitive to target energy as it is cooled by the gas from the battery/coolant unit (BCU). The Redeye seeker is capable of detecting target IR radiation and producing the acquisition signal within 3 to 5 seconds after activation.

2102. WEAPON COMPONENTS

The Redeye weapon consists of three major elements: the missile, launcher, and battery/coolant unit. The total weight of the weapon is approximately 29 pounds. The launcher (see fig. 9) contains the means for assisting the gunner in acquiring the target, prelaunch conditioning, and firing the missile. The BCU (see fig. 10) provides the electrical power required to prepare the weapon for firing, and the coolant required to prepare the missile seeker for target acquisition and tracking. The missile (see fig. 11) is sealed within the launcher to provide protection during transportation and against climatic conditions. A shoulder sling is attached to the launcher for carrying the Redeye when it is not enclosed in the storage container. Figure 12 shows the Redeye in the firing position. The remaining elements of the system are a shipping and storage container, a test set, and three training devices--an intercept-aerial trainer, a field handling trainer, and a Redeye Launch Simulator (RELS). (See fig. 13.) Figure 14 illustrates the Redeye Guided Missile System Data.

a. Launcher.--The launcher (see fig. 9) consists of three main sections: launch tube, gripstock, and sight assembly. The launcher

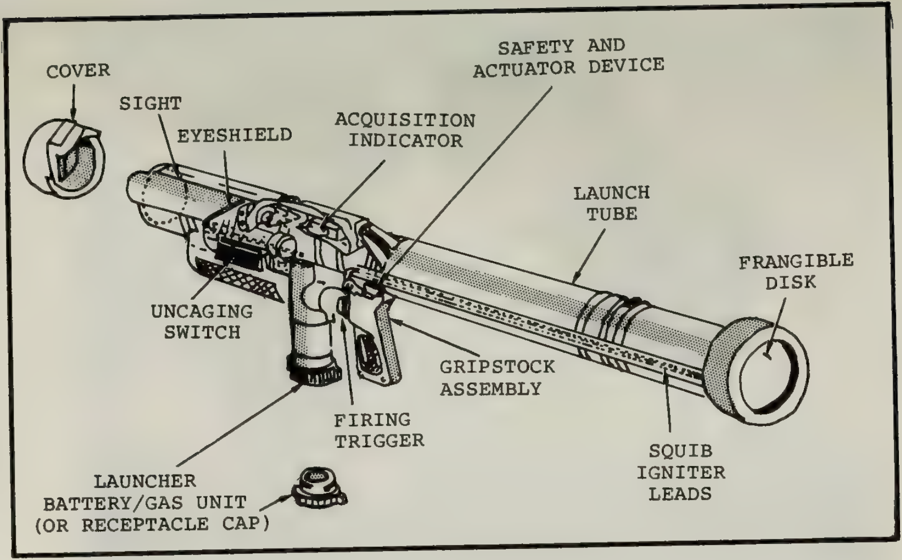


Figure 9.--Redeye Launcher XM41E2 (Exploded View).

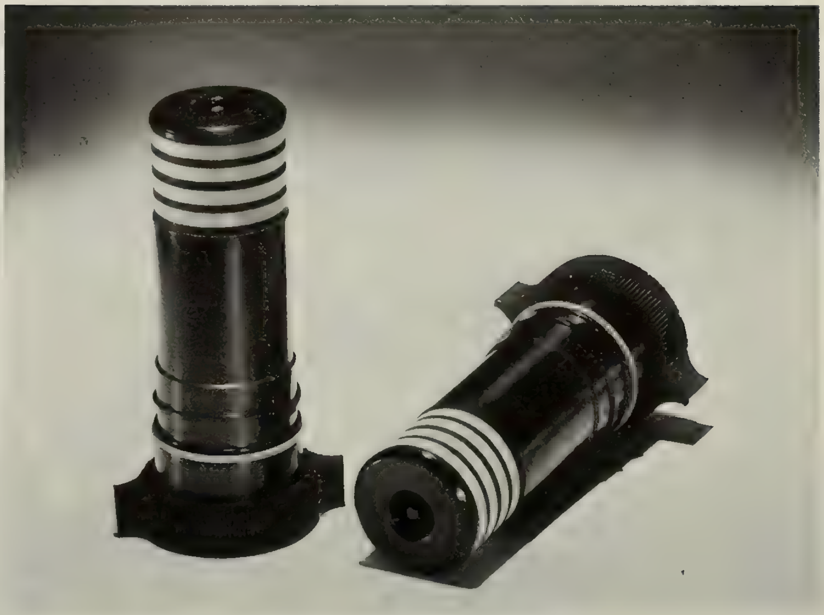


Figure 10.--Battery/Coolant Unit.

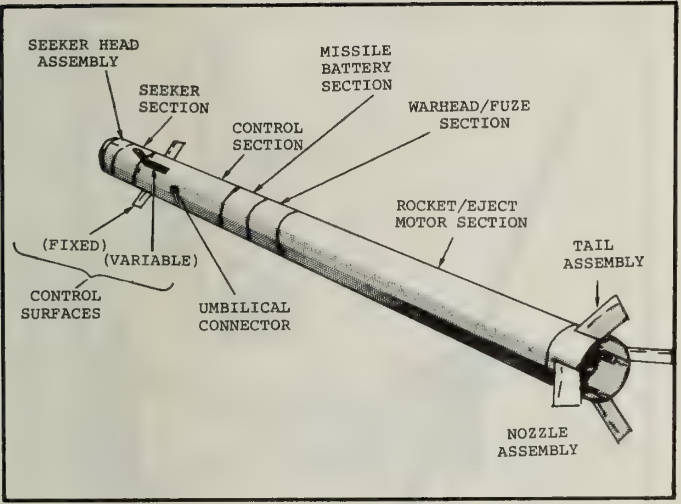


Figure 11.--Redeye Missile.

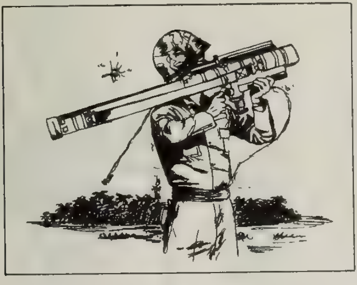


Figure 12.--Redeye in the Firing Position.

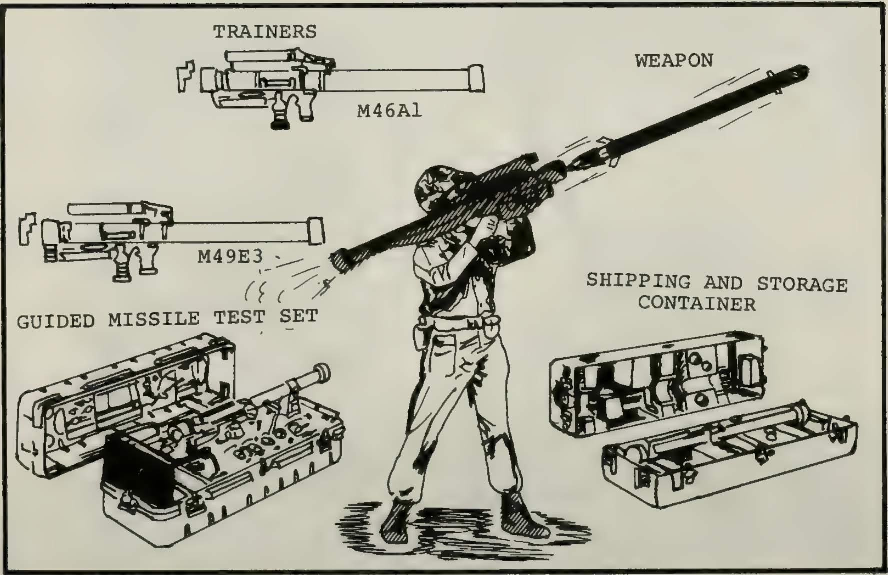


Figure 13.--Redeye Guided Missile System

STEM	LENGTH	WIDTH	HEIGHT	DIAMETER	WEIGHT
Redeye Weapon (Complete With Caps and Battery Coolant Unit) (M41E2)	50.5 In.	4.7 In. (Sight Folded)	10.9 In. (Sight Folded)	--	28.9 Lbs.
Missile	47.5 In.	--	--	2.75 In.	18.0 Lbs.
Launcher (Without Caps, Sling, and Battery Coolant Unit)	49.7 In.	--	--	3.61 In.	8.5 Lbs.
Battery Coolant Unit	6.0 In.	--	--	2.1 In.	1.2 Lbs.
Shipping and Storage Container (Monopak) (M571)	56.5 In.	17.5 In.	12.5 In.	--	--

Figure 14.--Redeye Guided Missile System Data.

provides the gunner with a means of transporting, aiming, and firing the missile. The electrical connection between launcher and missile is made through a connector assembly (umbilical) which is retracted just prior to missile launch.

(1) Launch Tube.--The launch tube contains the missile and is the main support for all other parts of the launcher. The forward end of the tube contains electrical coils which provide for seeker gyro spin to the prelaunch spin rate. The front and rear ends of the launcher tube are sealed with frangible discs. These discs seal the missile within the low humidity environment maintained in the launch tube; the front disc being a filter, transparent to the infrared radiation required to allow the missile to acquire the IR source while sealed within the launch tube. The front disc is broken upon missile ejection, and the rear disc is blown away by "eject" motor blast.

(2) Gripstock.--The launcher gripstock assembly is attached to the lower forward end of the launch tube. It contains controls, electronic modules, BCU receptacle, and coolant tubing necessary to condition and launch the missile. The coolant tubes to the missile shear upon missile ejection. The pistol grip, near the center of balance of the weapon, is the natural right-hand point. Located forward of the grip is the BCU receptacle which has a receptacle cap installed during storage and transportation of the weapon. The controls included with the gripstock consist of the safety and actuator device, uncaging switch, and the firing trigger.

(a) Safety and Actuator Device.--The safety and actuator device is a manually operated mechanism which, when activated, provides the necessary electrical pulse required to energize the BCU.

(b) Uncaging Switch/Bar.--The uncaging switch/bar is a manually operated switch used to uncage the gyro allowing the detector cell to remain locked on the IR source independent of slight movements of the launcher during the firing sequence.

(c) Firing Trigger.--The manually operated firing trigger electrically energizes the missile, and after a short delay to accommodate component stabilization and umbilical retraction, ignites the eject motor.

(3) Electronic Modules.--The electrical power required to prepare the weapon for firing is supplied by the battery portion of the BCU. Electronic modules located within the gripstock provide prelaunch power and signal distribution to the missile through the umbilical assembly.

(4) Coolant.--The coolant required to bring the detector within the low temperature range for optimum acquisition of an IR source is supplied by the coolant portion of the BCU. Distribution to the seeker/detector of the missile is by means of a coolant tube from the BCU through the gripstock into the missile.

b. Missile Round.--The missile (see fig. 11) consists of seven major sections: seeker section, control section, missile battery, fuze and warhead, rocket motor, "eject" motor, and tail assembly.

(1) Seeker Section.--The seeker section contains the seeker head (gyro optics unit) and electronic modules. The seeker receives IR energy from the target and produces an audible acquisition signal which informs the gunner the target has been acquired. After launch, it generates signals to the control section which are used to correct the flight of the missile, steering it to the target. A detector cell within the seeker detects the IR radiation from the target and converts it into electrical signals which are used to keep the seeker locked on the target. Automatic seeker tracking of the target IR radiation occurs when the gyro is uncaged prior to launch and during missile flight.

(2) Control Section.--The control section is made up of an electronic unit and motor-driven control surfaces (wings). Two pairs of wings, folded when the missile is in the launch tube, unfold and lock into place when the missile is fired. One pair is fixed while the other pair is controlled by a set of gears driven by an error steering motor. An electronic unit provides the power and signals to the steering motor. The signals received are error signals indicating the missile is not in the proper flight path, and the steering motor moves the wings the required amount to direct the missile to the target. At launch, the umbilical is retracted and the missile battery then provides the required power to the seeker and control sections.

(3) Missile Battery Section.--The missile battery section provides the electrical power for the missile during flight. The battery contains an electrolyte which is inactive at normal temperatures, but is activated

from the heat produced by ignition of the fuze strips located between battery cells. Battery activation, initiated by pulling the firing trigger, produces the necessary voltage output within 0.5 seconds after ignition of the thermal fuze strips. This causes a slight delay in missile launch after pulling the fire trigger.

(4) Fuze and Warhead Section.--The fuze and warhead section consists of a fuze and warhead.

(a) Fuze.--The fuze functions are to ignite the sustainer rocket motor after missile ejection at the proper time and to arm and detonate the warhead. The fuze also includes safety features to ensure the Redeye is safe for shipping and handling. The fuze timer is activated when the missile has reached sufficient acceleration. The timer controls sustainer ignition, arming of the warhead, and self-destruction of the missile in the event the missile does not contact the target.

(b) Warhead.--The warhead is not armed and cannot be detonated until the missile is launched and is a safe distance from the gunner. The warhead, when armed, can be detonated in any one of three ways: upon penetration of the metal surface of the target; by impact of the missile striking the target; or by self-destruction after approximately 15 seconds of missile flight.

(5) Rocket-Motor Section.--The rocket motor, or sustainer, contains a solid propellant which provides thrust to accelerate and propel the missile in flight. Following missile "eject" and "coast," the sustainer motor fires and burns for approximately 5.6 seconds.

(6) "Eject" Motor.--The "eject" motor consists of a solid propellant which provides the thrust necessary to eject the missile from the launch tube. The propellant, which is completely expended before the missile leaves the launch tube, also provides initial missile spin. When the trigger is pulled, power from the launcher BCU fires the "eject" motor (after the required delay for the missile battery to attain activation). Following "eject" motor burnout, the missile coasts for approximately 7 meters prior to ignition of the sustainer motor.

(7) Tail Assembly.--The tail assembly consists of four folding stabilizing fins. Prior to firing, the fins are in a folded position within the launch tube. When the missile is fired, the ejection motor gases strike the folded canted tail fins, causing the missile to spin counterclockwise. Upon missile ejection, the tail fins snap into place and are locked in flight position. They continue the counterclockwise spin, a necessary function of missile guidance throughout flight.

c. Battery/Coolant Unit (BCU).--The battery/coolant unit (see fig. 10) is a cylindrical case with an insulated plastic cap on the bottom. It consists of a thermal battery which energizes the launcher electrical circuits during the prelaunch sequence and a coolant gas supply bottle which supplies coolant gas to maintain the required low temperature in the IR detector in the missile seeker. The BCU is inserted in the launcher prior to activation of the weapon. The unit is activated by the safety and actuator device on the launcher. Once activated, the battery will supply electrical power for a minimum of 30 seconds. A hollow needle on the BCU enters a sealed port in the launcher coolant supply line when the BCU is inserted in its receptacle. The coolant gas is released into the supply line simultaneously with the activation of the BCU. Each BCU is used once and then discarded. In the event the BCU is activated and the engagement is aborted with no attempt to fire, the BCU must be replaced prior to another attempt to engage. Three BCU's are issued with each weapon.

2103. SHIPPING AND STORAGE CONTAINERS

The monopak shipping and storage container, M571, is a two-piece fungus and moisture resistant aluminum shell with a capacity of one Redeye weapon and three BCU's. Saddle type polyethylene padded supports hold the weapon firmly within the container. The BCU's are contained in firm formfitting receptacles. The container is designed to provide the weapon with protection against shock and vibration encountered during all modes of transportation, including palletized airdrop. The construction of the container will allow stacking seven tiers high in storage. When the container is closed, 10 latches provide sufficient sealing pressure to ensure a spray-tight seal under all operating conditions. The weapon is readily accessible by releasing the latches and removing the lid. Handles are provided to facilitate lifting and handling. These handles are positioned to allow two men to effectively transport or load the containers.

2104. TEST SET

The Redeye guided missile test set AN/TSM-82 (see fig. 13) is used to determine the operational readiness of the Redeye missile, the tracking head trainer, and RELS. For further information, see TM 9-1400-425-35.

2105. TRAINING DEVICES

There are four training devices used to train personnel in the operation and handling of the weapon.

a. Tracking Head Trainer.--The tracking head trainer (see fig. 15) is a full-scale model similar to the actual Redeye weapon in weight, size, operation of controls, and pre-launch operational characteristics. The trainer provides all functions of the weapon except actual missile launch. The trainer is T/E equipment of the FAAD battery. When used during training exercises, they provide the gunner an excellent device in maintaining gunner proficiency. They also provide an effective means of evaluating gunner performance. For a full discussion of the trainer, see appendix B.

b. Field Handling Trainer.--The field handling trainer (see fig. 13) is an expended launcher which has been ballasted to simulate the weight and balance of the tactical weapon. It is used only for familiarization and has no functional components. For a full discussion of the trainer, see appendix B.

c. Redeye Launch Simulator (RELS).--The

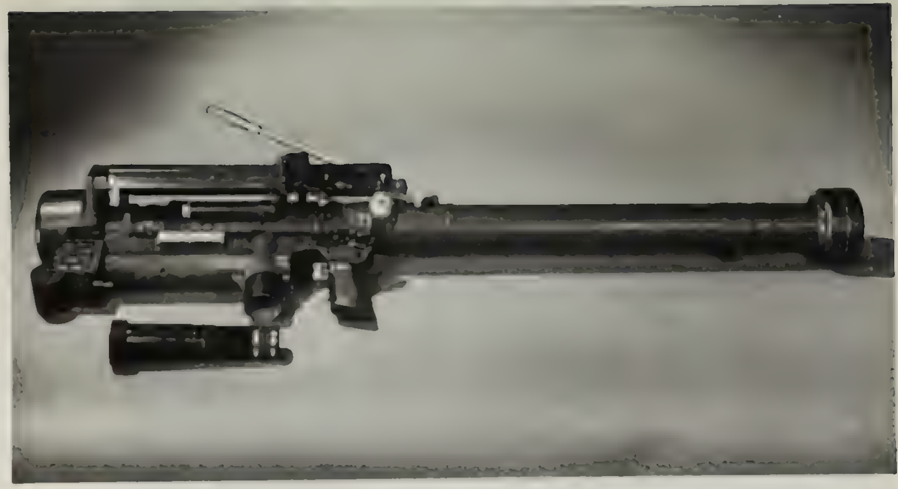


Figure 15.--Redeye Tracking Head Trainer M49E3 With Battery.

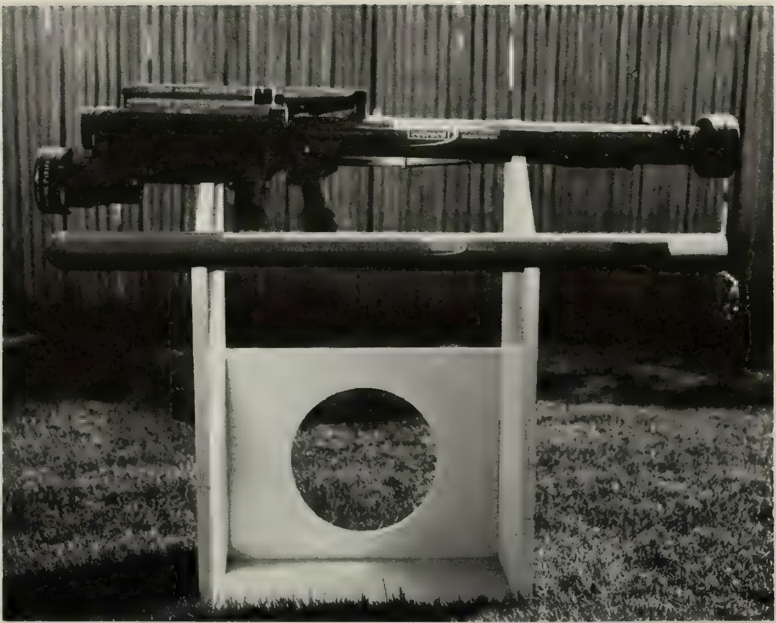


Figure 16.--Redeye Launch Simulator (RELS).

RELS (see fig. 16) is a training device that duplicates all functions of a Redeye missile launch. The RELS utilizes an eject motor to ballistically launch an inert missile to a maximum range of less than 350 feet. Safety considerations require a range area clear of obstructions and personnel extending a minimum of 350 feet forward and 42 feet rearward of the launch area. For a full discussion of this trainer, see appendix B.

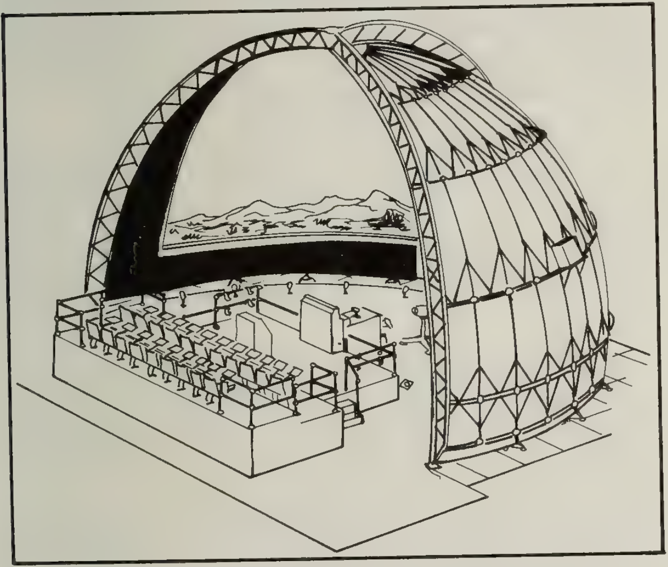


Figure 17.--Redeye Moving Target Simulator Trainer, Device M87.

d. Redeye Moving Target Simulator (MTS).--The MTS (see fig. 17) is a training device used to train Redeye gunners in the proper use of the Redeye weapon. It incorporates the use of the tracking head trainer against the flight of moving aircraft on a large screen. The aircraft are projected on the screen by the use of a movie projector and a series of mirrors. An invisible IR source is superimposed over the aircraft which is only present as it would be if the aircraft was actually flying. It also incorporates actual sounds of the flying aircraft including fixed-wing and helicopters. For a full discussion of this trainer, refer to appendix B.

Section II. WEAPON FUNCTIONS

2201. GENERAL

This section describes the functional sequence of firing the Redeye weapon. The functional sequence begins when a potential hostile aircraft has been detected. Steps in Redeye weapon functioning are discussed below.

2202. WARMUP

Operation of the safety and actuator device provides an electrical impulse which activates the launcher BCU. Due to warmup delay and limited battery life, the Redeye weapon must be activated at the correct range and normally must be fired within approximately 30 seconds after activation of the BCU. The following events occur during warmup of the Redeye weapon (see fig. 18):

a. Launcher BCU Activated.--Operating the safety and actuator device activates the launcher BCU which provides power for the missile and launcher and starts the gas coolant flow for prelaunch conditioning of the weapon.

b. Gas Coolant Flow.--Coolant gas flows from the BCU through the supply tube to the IR detector which is cooled to minus 100 degrees Fahrenheit within 5 seconds and then exhausts to the atmosphere through the exhaust tube. Gas supply lasts 35 seconds.

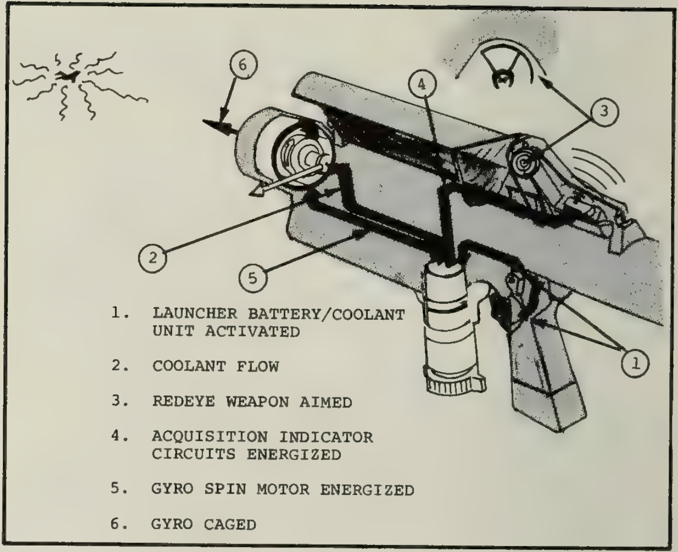

6
4
3
2
5
1
1. LAUNCHER BATTERY/COOLANT UNIT ACTIVATED
2. COOLANT FLOW
3. REDEYE WEAPON AIMED
4. ACQUISITION INDICATOR CIRCUITS ENERGIZED
5. GYRO SPIN MOTOR ENERGIZED
6. GYRO CAGED

Figure 18.--Events During Warmup.

c. Weapon Aimed.--The Redeye weapon is aimed so that the target image appears in the center of the sight ranging ring.

d. Acquisition Indicator Circuits Energized.--The speaker circuits are energized by the launcher battery. These acquisition circuits indicate when the IR seeker has acquired the target. The weapon has a transducer (speaker) which provides an audible signal to the ear and vibrations to the gunner's cheekbone to indicate acquisition.

e. Gyro Spin Motor Energized.--The gyro spin motor is energized by the launcher battery and starts to spin the gyro to full speed. The speaker provides an audible indication of gyro spin-up.

f. Gyro Caged.--The launcher battery energizes the gyro cage circuit so the gyro is directed to an electrically caged position to be bore sighted to the gunner's line of sight.

2203. ACQUISITION

Assuming that the target is within range and provides enough IR energy to activate the seeker, 3 to 5 seconds will be required before an acquisition signal can be obtained after activation. This delay allows the gyro in the missile to obtain proper operating speed and for the detector cell to be cooled sufficiently. When the seeker senses the target, the acquisition indicator sounds. If the gunner wavers off the target in the caged condition, the audible signal will change tone or cease. The following occurs during the period in which the target is acquired (see fig. 19.):

a. An IR detector cell in the seeker senses an IR signal and converts it into an electrical output which is applied to the acquisition indicator circuits.

b. The indicator circuits then apply the signal to the transducer where an audible tone is transmitted and the transducer vibrates.

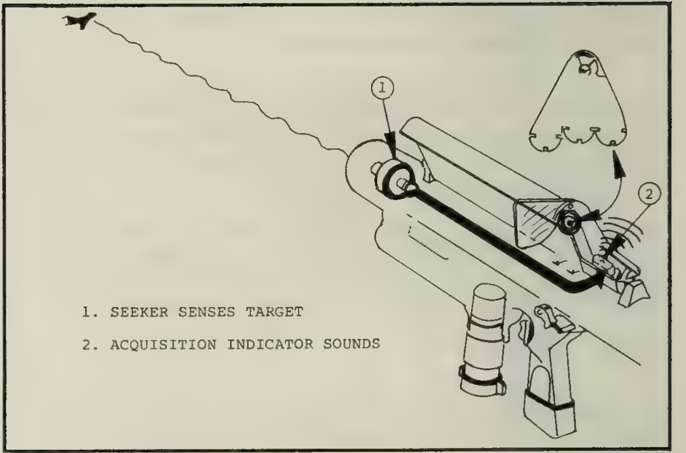


Figure 19.--Acquisition.

2204. UNCAGING THE GYRO

When acquisition signals are obtained, the gunner presses and holds the uncaging switch (see fig. 20). This action allows the missile seeker to track the target independently of launcher movement. The gunner will notice a change in the tone of the acquisition signal when the uncaging switch is pressed as the seeker accurately and automatically tracks the infrared source. The gunner must ensure the IR acquisition tone is present prior to insertion of superelevation and lead.

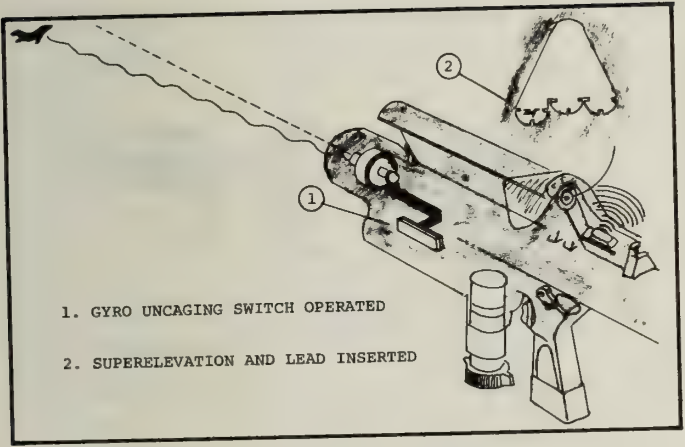

②
①
1. GYRO UNCAGING SWITCH OPERATED
2. SUPERELEVATION AND LEAD INSERTED

Figure 20.--Gyro Uncaged; Seeker Tracking.

2205. SUPERELEVATION AND LEAD

Raising the launcher to an angle above the line of sight to the target is called applying superelevation. (See fig. 21). When the target is within the launch zone, superelevation (and lead as necessary) is inserted by moving the weapon to properly reposition the target image in one of the three lower semicircles of the sight. Superelevation (and lead as necessary) is not inserted until just prior to firing. Should a gunner fire at a low-flying target and not apply superelevation, the missile could strike the ground prior to sustainer ignition. The gunner must also

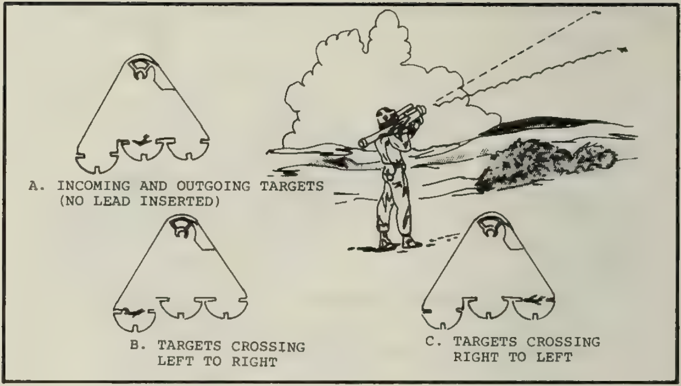


Figure 21.--Determine Target Is in Launch Zone and Apply Superelevation (Insert Lead as Required).

ensure the acquisition tone is still present after inserting superelevation (and lead as necessary) prior to firing.

2206. FIRING THE MISSILE

When the Redeye team has identified the target as hostile, the gunner has determined it is within the launch zone, and superelevation (and lead as necessary) has been inserted, the weapon is fired by pulling the trigger (see fig. 22). The firing trigger must remain pressed, the uncaging switch must be held down, and the gunner must continue a followthrough track on target for about 1 second until the

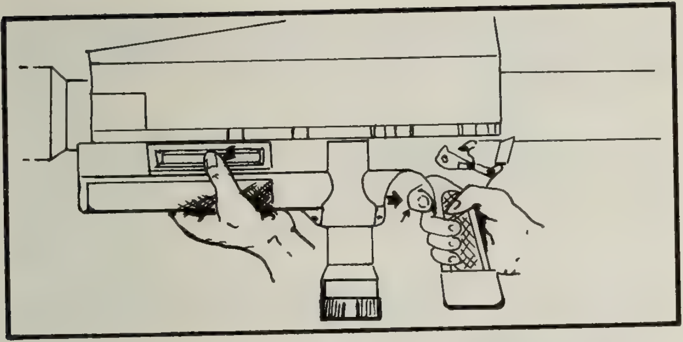


Figure 22.--Press and Hold Down Firing Trigger; Continue to Track Target.

missile clears the launch tube. There is no recoil when firing the Redeye weapon, only a slight twist counterclockwise and a change in the weight of the launcher as the missile is ejected. If the firing trigger has not been pressed and there is sufficient BCU time remaining, the gunner can release the uncaging switch and reacquire a lost target or acquire a new target. If the firing trigger has not been pressed and the mission is aborted, a new BCU is required to make the weapon ready for another engagement.

a. Missile Battery Activated.--Pressing the firing trigger activates the missile battery.

b. Umbilical Retract.--The umbilical is

retracted from the missile approximately 0.5 seconds after the firing trigger is pulled, depending on the electrical output of the missile battery.

c. "Eject" Motor Fires.--Retraction of the umbilical causes the "eject" motor to ignite in the launch tube.

2207. MISSILE EJECTION

When the "eject" motor fires, the

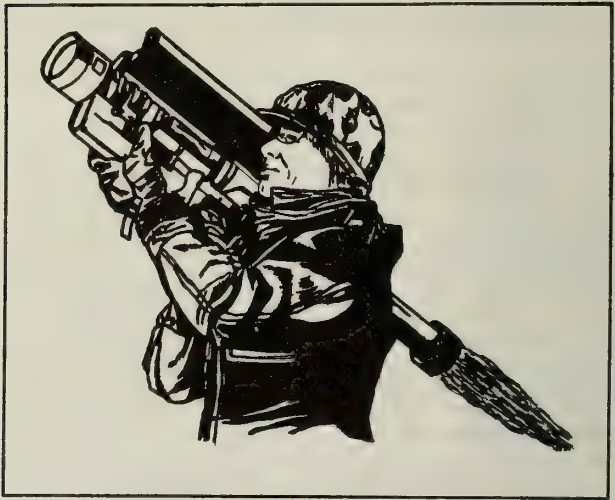


Figure 23.--Press and Hold Firing Trigger; Ejector Fires.

missile starts spinning and then leaves the launch tube (see fig. 23). This motion is caused by the canted position of the folded tail fins in the "eject" motor exhaust stream.

a. Missile Spin.--Before the missile leaves the launcher, it is spinning at full rate (12 RPS) by the force of the ejector motor exhaust against the still-folded canted tail fins.

b. Fuze Timer Starts.--When the missile reaches an acceleration of 28 g's, the initial switch in the fuze timer closes and the fuze timer starts. The ejector motor is completely expended before the missile leaves the launcher.

2208. MISSILE COAST

From the force imparted by the "eject" motor, the missile coasts approximately 7 meters from the gunner before the sustainer motor fires (see fig. 24). As the control wings and tail fins clear the launch tube, they snap out and lock in place. The control wings are spring loaded, and the tail fins are brought into position by the spinning of the missile. To compensate for missile drop in elevation during the coast phase, superelevation must have been inserted prior to firing.

2209. SUSTAINER MOTOR IGNITION

In this phase, the sustainer motor ignites, the fuze timer initiates warhead arming and the self-destruct cycle is started. (See fig. 25.)

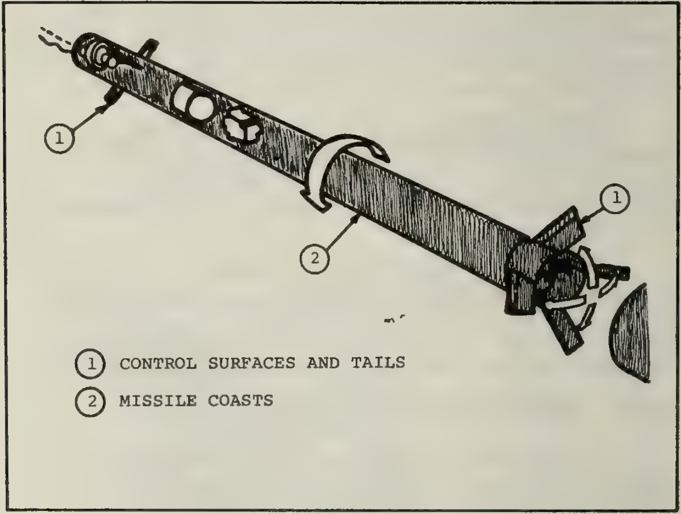


Figure 24.--Missile Coast.

a. Sustainer Motor Ignites.--A fuze activates the sustainer motor firing circuit 0.31 seconds after the missile is ejected. At this time, the missile is approximately 7 meters from the gunner. This delay ensures that the missile is clear of the gunner before the sustainer motor ignites.

b. Warhead Arming.--The fuze arms the warhead 1.6 seconds after the fuze timer starts (provided the missile has reached sufficient acceleration).

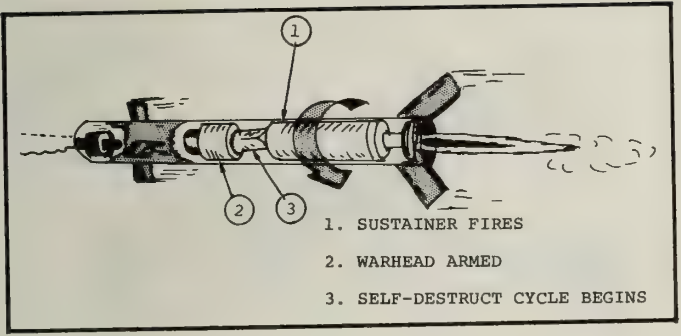


Figure 25.--Sustainer Motor Ignition and Warhead Arming.

c. Self-Destruct Cycle.--At the time the warhead is armed, the self-destruct cycle is started.

2210. GUIDANCE

In the guidance phase of operation, the seeker guidance system detects any difference between the line of flight of the missile and the seeker line of sight (see fig. 26).

a. Tracking the Target.--The seeker section detects differences between the seeker (gyro) line of sight and the source of target IR energy. This tracking error signal is used in a tracking servo-loop to correct the attitude of the gyro so as to continuously aim the missile at the target.

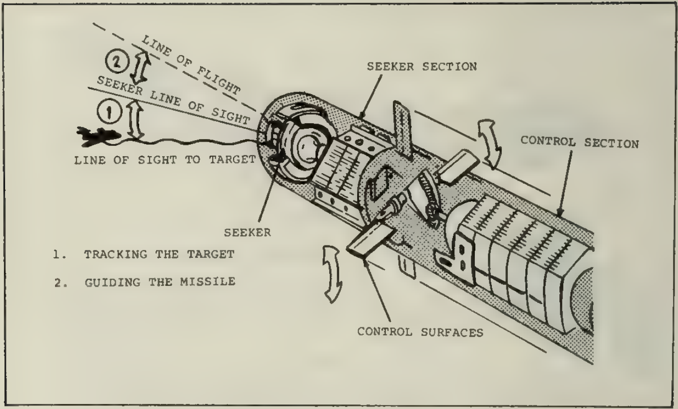


Figure 26.--Guidance.

b. Guiding the Missile.--The control section, using the tracking output signal supplied by the seeker, generates steering commands which are applied to the moveable control surfaces. Proportional navigation is used in guiding the missile on a collision course to the target.

2211. WARHEAD DETONATION

In the final phase, the warhead either explodes on target penetration or impact, or is destroyed in flight by a self-destruct mechanism (see fig. 27).

a. Target Hit.--The warhead will be detonated by one of two methods when the

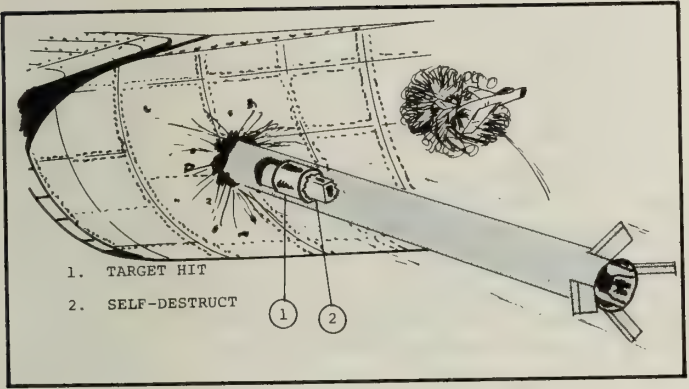


Figure 27.--Warhead Detonation.

missile hits the target:

(1) The penetration impulse generator will detonate the warhead as the missile body penetrates the metal skin of a target.

(2) An impact switch will detonate the warhead if the missile impacts and does not penetrate the skin of the target.

b. Self-Destruct.--If the missile does not hit the target, the warhead will be detonated by a self-destruct system approximately 15 seconds after launch.

Section III. ENGAGEMENT PROCEDURES

2301. GENERAL

a. The basic techniques necessary for a FAAD gunner to successfully engage a target are an extremely important part of the training and knowledge of each FAAD gunner. These techniques include visual detection of targets, determination of target course, determination of target type, recognition of target, and ranging of the target.

b. The engagement procedures discussed below are:

(1) Target detection and search and scan procedures.
(2) Aircraft characteristics and recognition.
(3) Infrared radiation acquisition of targets.
(4) Ranging techniques and range ring profiles.
(5) Conduct of fire.

2302. TARGET DETECTION AND SEARCH AND SCAN PROCEDURES

The first step in the Redeye engagement sequence is to locate the target. Team members act either alternately or simultaneously as observers in a tactical situation, thus target detection may be made by either member. The effectiveness of the Redeye weapon system may be increased by early visual detection of hostile aircraft. The FAAD headquarters element must receive and interpret early warning information passed via the various communication nets and be able to convert significant information into a form that can be rapidly disseminated to and utilized by the FAAD teams. Similarly, appropriate FAAD team detection and engagement data should be entered by the FAAD headquarters into appropriate nets.

a. Factors Affecting Visual Detection. --The FAAD team member is the human link in the detection process. His efficiency and effectiveness is dependent primarily on his state of training but may vary from moment to moment as a result of his motivation or because of events taking place in his field of view that may distract his attention. Major factors that affect the ability of the FAAD team member to detect aircraft are visual acuity, size of the assigned search sector, target characteristics, and environmental conditions.

(1) Early Warning.--The ability of the Redeye gunner to visually detect and recognize low-altitude aircraft is increased by adequate early warning. Early warning is information concerning possible enemy air activity to include location, direction of approach, number of aircraft, and any other data disseminated to air defense units. Early warning information is gathered from such sources as forward observers, friendly aircraft, and radars. Early warning communication facilities may give advance warning from a few seconds to a few minutes before an aircraft is

sighted. The detection range is greater when there is adequate early warning, good visibility, and no terrain masks.

(2) Visual Acuity.--Redeye personnel are required to visually detect, recognize, and identify aircraft. This requires that they have at least average visual acuity.

(3) Search Sectors

(a) Visual search is the systematic visual coverage of a given area. This method of surveillance is used by the Redeye team member. (See FM 1-80, Aerial Observer Techniques and Procedures, for a discussion of search and scan procedures.) Systematic visual search takes advantage of the inherent capability of human vision to detect fine detail.

(b) A search sector is defined as a limited portion of the gunner's entire field of observation.

(c) Factors influencing the size of search sectors are: distance between Redeye teams, visibility, terrain masks, the limits of human observation, and the availability of early warning.

(4) Search Sector Size.--In general, the range of visual aircraft detection increases with a decrease in the size of the search sector assigned to the FAAD team. If a search sector of 360 degrees is assigned, targets may approach closer to the defended area before detection than if the search sector is narrowed, for example to 45 degrees.

(5) Target Characteristics.--The ranges at which aircraft can be detected vary greatly with specific conditions. In addition to visual acuity and search sector size, the

most critical variables which affect detection are target and environmental characteristics.

(a) Size of Target Profile.--Target size has a great effect on detection range. For example, a large bomber jet aircraft can be detected at a far greater range than a smaller jet aircraft.

(b) Target Speed.--In general, detection range decreases for a particular target as its speed increases.

(c) Target Altitude and Heading.--Both the altitude and heading of aircraft influence detection range. Crossing targets usually can be detected at greater ranges than the same targets on courses directly toward or away from the observer, because crossing targets present larger profiles.

(d) Target Color.--An aircraft whose color contrasts with its background is visible at greater distances than an aircraft which has been camouflaged or is of a color which blends with the background.

(6) Environmental Characteristics

(a) Visibility.--Visibility conditions vary widely in different parts of the world. Factors that reduce visibility include fog, haze, dust, smoke, rain, and clouds.

(b) Illumination.--The visibility of an aircraft is influenced by its contrast with the background against which it is viewed. The contrast is in part dependent on the position of the sun in relation to the target.

(c) Terrain Masking.--Terrain masking results from the existence of mountains, hills, trees, buildings, or clouds between the gunner and the target.

b. Methods of Search and Scan.--FAAD team members employ visual search and scan procedures to detect approaching hostile aircraft. The technique of thoroughly covering the area or sector of search for the presence of targets is termed visual search. Visual search is conducted from the gunner position and generally includes a specific field of view. FAAD positions are selected to take advantage of the most favorable terrain. Because early warning information may not be available, the FAAD team employs definite search and scan procedures to prevent surprise attack by enemy aircraft. This method of visual search is called scanning. Scanning is a step-by-step method of looking at the ground and sky. Two procedures are suggested for search and scan, one for use in flat terrain, the other for use in hilly terrain. In each procedure, the individual should focus on a distant object, cloud, or terrain feature every few seconds so that the eyes remain focused on distant objects. If not, the eye will relax and distant objects will become blurred.

(1) Flat Terrain.--In the daytime, the observer's line of vision has to stop on an object to see it in detail. When the gunner moves his line of vision rapidly across a flat horizon, he will see very little detail. When the gunner moves his line of vision in short steps from point to point, he is more likely to see detail. The recommended search and scan technique for flat terrain observation is shown in figure 28.

(2) Hilly Terrain.--In the case of hilly terrain, the gunner should scan the sky using the horizon as a starting point as shown

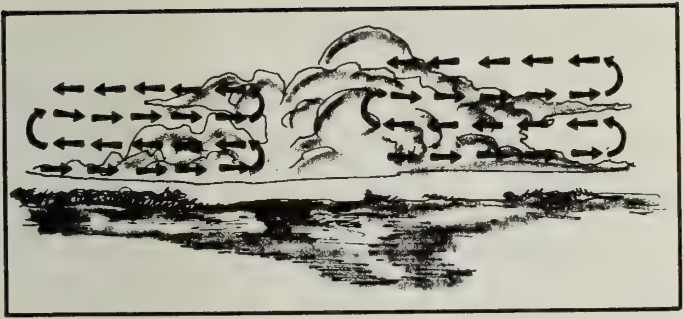


Figure 28.--Search and Scan Techniques in Flat Terrain.

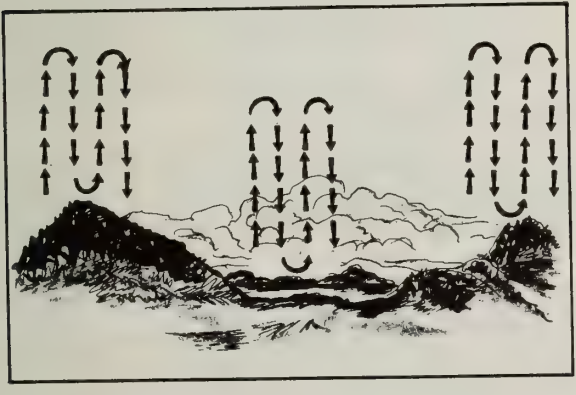


Figure 29.--Search and Scan Techniques in Hilly Terrain.

in figure 29. Prominent features are used as points of reference.

c. Search and Scan Duties.--Alternating search and scan duties will reduce fatigue on both team members. One member searches for aircraft while the other member performs other team duties. Gunners should not look for aircraft for periods longer than 40 minutes at one time. Unless the team has been alerted to the approach of potential hostile aircraft, only one team member should be searching for enemy aircraft. Procedures for surveillance when a specific search sector has not been assigned include:

(1) Search all likely avenues of aircraft approach to the defended position.

(2) Divert attention occasionally to other sectors to prevent surprise by hostile aircraft.

(3) Search the entire horizon (360 degrees) periodically.

d. Target Track.--Following visual detection, the gunner continues to observe the aircraft to determine the aircraft type, aircraft track (flight path), and the target size profile.

(1) Aircraft Type.--Aircraft type is discussed in paragraph 2303.

(2) Aircraft Track.--The aircraft track is the flight path of the target as viewed by the gunner. Determination of the track is particularly important during engagement of a high performance target and is used by the gunner to estimate crossover. Crossover

is the midpoint of the target flight path to the gunner position where the aircraft is closest to the gunner and the rear portion of the aircraft is beginning to be presented to the gunner's field of view. Target direction is determined to be incoming-crossing, outgoing-crossing, incoming-overhead, or outgoing-overhead. An incoming-crossing or outgoing-crossing target crosses offrange from the gunner position more than 500 meters. An incoming-overhead or outgoing-overhead target flies directly overhead or within 500 meters of the gunner's position.

2303. AIRCRAFT CHARACTERISTICS AND RECOGNITION

a. General.--One of the primary factors in the FAAD engagement sequence is to recognize the type of aircraft. Types of aircraft of most concern to the FAAD gunner include fighters, fighter-bombers, attack, light transports, light aircraft, and helicopters. The correct solution to the FAAD gunnery problem depends to a great extent on the gunner's knowledge of aircraft characteristics. The gunner must be able to differentiate between enemy and friendly aircraft that operate over the area of Redeye employment. Aircraft of potential enemy and friendly forces have many identical features. Each gunner must be able to recognize aircraft types and know how to estimate their approximate dimensions. A small error in estimating wingspan or fuselage length is not critical but a large error could result in missing the target completely. With high-speed targets, the gunner's evaluation of aircraft dimensions must be made rapidly while engaging the target. When FAAD gunners are using the tracking head trainer during tracking and simulated engagement exercises, actual aircraft should be employed to give gunners as much practice as possible in tracking different types of aircraft.

b. Aircraft Characteristics.--The gunner must know the general dimensions of an aircraft to enable him to estimate range. This does not imply that the gunner must remember a mass of data concerning each aircraft. Knowing the approximate length of wingspan is much more useful information, for example, than knowing the weight or cargo capacity of aircraft. The vital information about an aircraft for use by the gunner includes wingspan in meters, fuselage length in meters, approximate normal operating speed (knots/meters per second), and type of engine(s) (jet or reciprocating).

(1) Aircraft Dimensions.--The overall dimensions of an aircraft are directly related to target ranging. The dimensions of a fixed-wing aircraft include wingspan and fuselage length. The dimensions of a helicopter are cabin width and fuselage length. The dimensions which are normally measured in feet and inches have been converted to meters and rounded off for use by the Redeye gunner to simplify target ranging. The length of the fuselage or wingspan, as related to the sight picture seen by the gunner in the range ring, helps him determine the range to the target. Aircraft dimensions are further grouped into specific categories for solving gunner ranging and are described later in this chapter.

(2) Aircraft Speed.--The gunner's knowledge of the speed of general types of

aircraft will assist him during an engagement. By making a fair estimate of the aircraft's speed, he can readily determine whether it is within the Redeye weapon capabilities. While the gunner may not be able to estimate the approximate speed that an aircraft is flying, he should attempt to identify the aircraft type, jet or nonjet. In most cases, an error in speed estimate is not critical because gunner firing criteria has been optimized to compensate for error in speed estimates. During close support of ground operations, most aircraft fly at a speed of not more than 450 knots and at altitudes ranging from several hundred to several thousand feet. A typical jet attack aircraft, when effectively delivering its ordnance, has a ground attack speed between 300 and 450 knots. The attack speed of a jet aircraft during close-in ground support is a function of aircraft characteristics. Speeds of aircraft are further grouped into specific categories to ease the gunner ranging problem. A nonjet aircraft which is in a low-medium performance category has a speed of 0-300 knots. A jet aircraft falls into the high performance class of above 300 knots. An easy way to convert knots to approximate meters per second is to divide the speed in knots by two. For example, a 100-knot target is flying at a speed of approximately 50 meters per second.

(3) Type of Engine.--Engine type information is useful to the gunner during an engagement because the type of engine affects infrared acquisition. Most propeller aircraft can be acquired in a head-on aspect, but jet aircraft IR radiation is masked and requires the gunner to wait until the aircraft

is in a crossing or outgoing aspect. Some propeller aircraft and helicopters have the engine exhaust on only one side of the aircraft. When the aircraft is flying on a crossing course, the IR radiation source may be on the opposite side of the aircraft from the gunner's position, thereby reducing the probability of IR acquisition until the aircraft is close in. The exhaust may be shielded momentarily when the aircraft banks for a turn.

(4) Categories of Aircraft.--Aircraft against which Redeye may be employed have been separated into two categories based on their speed and IR radiation characteristics. These categories are low-medium performance aircraft and high performance aircraft.

(a) Low-Medium Performance Aircraft.--This category consists primarily of observation and reconnaissance propeller aircraft and helicopters.

1 Small Propeller Aircraft.--Small propeller aircraft (see fig. 30)

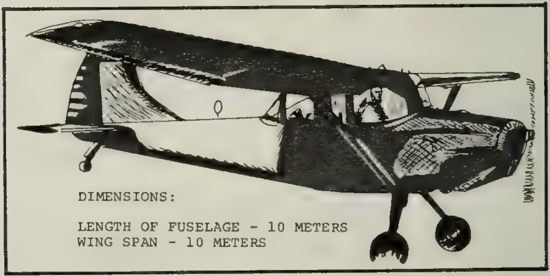


Figure 30.--Typical Low-Performance Liaison-Observation Aircraft.

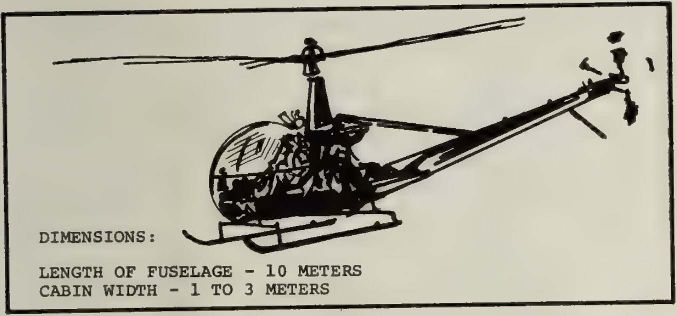


Figure 31.--Typical Light Helicopter.

have a 10-meter wingspan and a 10-meter fuselage length.

2 Helicopters.--Small helicopters (see fig. 31) have a 1- to 3-meter cabin (bubble) width and a 10-meter fuselage

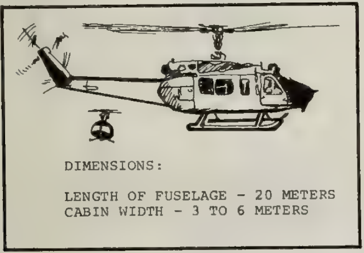
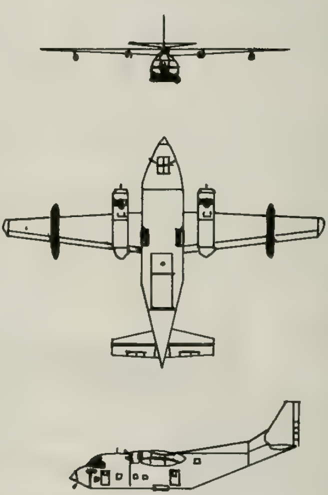


Figure 32.--Typical Medium Helicopter.

length. Large helicopters (see fig. 32) have a 3- to 6-meter cabin width and a 20-meter fuselage length.

3 Other Aircraft.--Also in the low-medium category are propeller driven transports and cargo aircraft which would not often be engaged by FAAD gunners. Representative aircraft (see fig. 33) have a wingspan of 30 meters and a fuselage length of 25 meters.



DIMENSIONS

FUSELAGE LENGTH - 25 METERS
WING SPAN - 30 METERS

Figure 33.--Typical Light Transport.

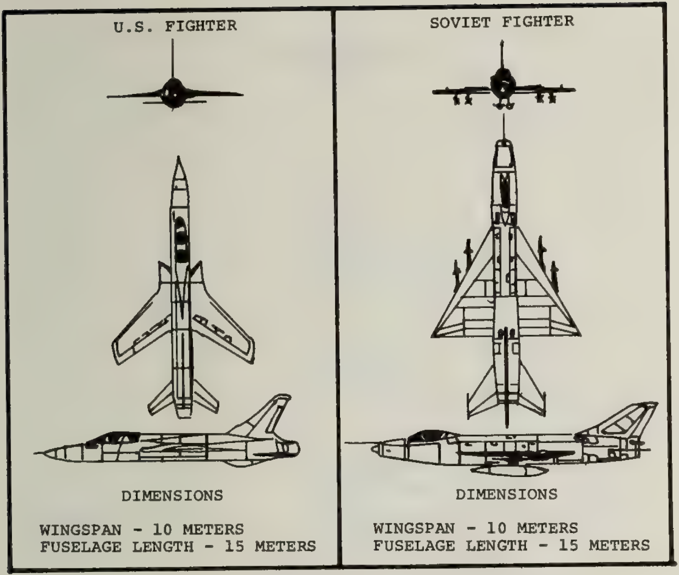


Figure 34.--Typical Jet Fighters.

(b) High-Performance Aircraft.--This category consists of all fighter and attack jet aircraft (see figs. 34 and 35). The small jet aircraft has a 10-meter wingspan and a 15-meter fuselage length. The larger jet aircraft has a 25-meter wingspan and a 30-meter fuselage length.

c. Aircraft Recognition.--At the earliest possible time in the engagement sequence, the FAAD team leader must visually

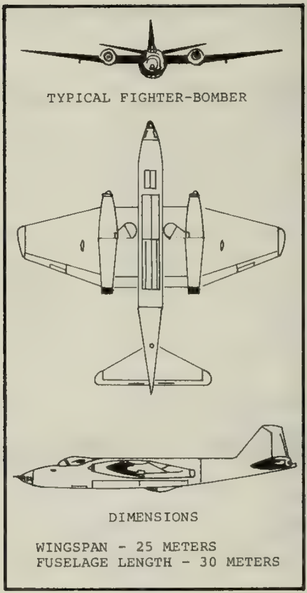


Figure 35.--Typical Fighter-Bomber.

distinguish between (or confirm identification of) friendly and enemy aircraft. When the FAAD team members are acting independently of each other, both members must identify aircraft independently. High speed, low-flying aircraft are difficult to identify, especially if friendly and enemy jets have similar silhouettes. Light reconnaissance aircraft (helicopters and propeller driven) fly slower, but may also have similar silhouettes and be difficult to identify. Target identification must always be viewed as a continuing process. Immediately upon detecting the aircraft, the FAAD gunner should make a preliminary (tentative) aircraft identification. When the tentative identification is hostile, the gunner should proceed with the engagement sequence to include weapon warmup, particularly in the case of high-performance aircraft. In every case, the gunner should proceed to establish track and only abandon track on a positive identification of friendly. If this tentative identification is friendly, the gunner continues to observe the aircraft to resolve any doubt, while ensuring other aircraft are not allowed to pass undetected during this time. Since rules for engagement require a visual, positive, hostile identification be made before the gunner fires, tentative, hostile identification will be further verified or changed, as necessary, prior to the moment of firing. If the identification as hostile is not positive, the rules for engagement normally require that the gunner hold fire.

d. Total Form Concept.--Success in aircraft recognition depends upon a knowledge of aircraft appearances. Recognition of aircraft by all external features is referred to as the "total form" concept. This can be achieved only by continued study augmented by a number of training aids available for this purpose. Aircraft must be studied from the standpoint of recognizing the distinguishing features of their particular shapes; however, two problems must be avoided.

(1) Minor details of aircraft should not be emphasized because they are not likely to be visible at long ranges.

(2) In analyzing an aircraft part by part, care must be taken not to lose sight of its overall configuration, or "total form." Each element should be examined, not as a recognition feature in itself, but as an integral part of the aircraft's general design.

e. Special Considerations

(1) Recognition skill is acquired only with practice. Gunners are never trained to the extent that further study is no longer needed. Constant review is essential as long as a requirement for aircraft recognition exists.

(2) FAAD gunners must have a minimum 20-20 vision (corrected) and a hearing loss no greater than 15 decibels between 500 and 2000 (Hz), or 40 decibels at 4000 (Hz).

(3) Aircraft recognition study is important because the FAAD gunner cannot rely on electronic means to identify aircraft, but must be able to visually recognize an aircraft as friendly or hostile and react accordingly.

(4) Supplementary methods for visual recognition of aircraft include:

(a) Use of binoculars.

(b) Use of early warning (radio).

(c) Recognition by several observers.

(d) Corridor immunity.

(5) During FAAD training, the gunner is introduced to the procedures of aircraft recognition. The FAAD gunner must

continue aircraft recognition training in the particular area where assigned in order to achieve and maintain maximum proficiency.

2304. INFRARED RADIATION ACQUISITION OF TARGETS

a. General.--In the Redeye engagement sequence, IR acquisition of the target by the seeker is essential for a successful engagement. Redeye engagement requires the gunner to have a knowledge of target characteristics, including IR radiation, so he can decide when to activate the weapon, acquire, and fire.

b. Infrared Acquisition Boundaries.--The target must be within seeker acquisition range. The acquisition boundary of the weapon is the point at which the target IR radiation is strong enough for the seeker to track the target. The target range at which acquisition is accomplished varies with the target radiation pattern, atmospheric conditions, and background radiation.

(1) Target Radiation Pattern.--A target radiation pattern is an outline of a constant level of IR radiation intensity. Figures 36 and 37 show the radiation patterns of two typical Redeye targets, a single-engine jet aircraft and a helicopter. IR radiation emanating from an aircraft has many sources, but the primary source is the hot metal parts of the engine exhaust system.

(a) The jet aircraft shown in figure 36 produces a radiation intensity that is strongest from a rear aspect and becomes weak as the nose aspect is approached, because

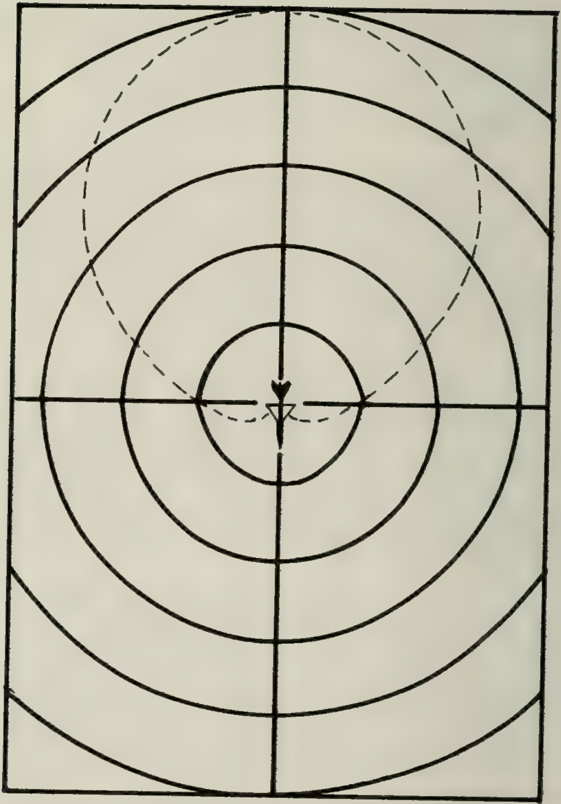


Figure 36.--Radial Pattern of Typical Jet Fighter.

the exhaust is directly to the rear of the aircraft. Because of the shape of the radiation pattern of a jet aircraft, IR acquisition may occur just prior to crossover for some jet aircraft and just at crossover or beyond for other jet aircraft.

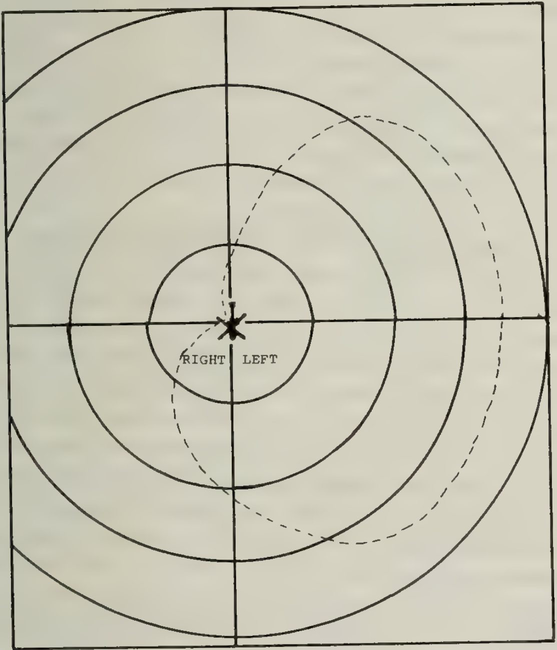


Figure 37.--Radial Pattern of Typical Helicopter With Exhaust on Left Side.

(b) The helicopter shown in figure 37 has a front-mounted engine and the pattern is based on an exhaust directed toward the left rear. Shielding of the source of radiation by the aircraft's fuselage, interior firewalls, and engine mounts permit very little radiation from the right side of the craft. However, this particular engine exhausts produces strong radiations from the front, left side, and left rear of the helicopter. Helicopters with top mounted rear exhaust engines produce a radiation pattern similar to that of jet aircraft. The radiation patterns of each type of aircraft differ, but in general, are strongest in aspects where the exhaust is viewed most directly.

(2) Missile Infrared Radiation Seeker Sensitivity.--The missile detects a target by optically focusing target IR radiations on the surface of an IR detector in the missile seeker system. The detector cell changes its electrical characteristics in the presence of IR radiation; the amount of change depends on the strength of the IR radiation received. The temperature of the cell determines the minimum signal strength that can be detected. The optimum detector cell sensitivity occurs at approximately minus 100 degrees Fahrenheit. Detection occurs whenever the IR radiation signal changes the electrical characteristics of the cell enough to activate the seeker circuits.

(3) Atmospheric Limitations.--The atmosphere is not completely transparent to IR radiations. Certain gases in the atmosphere, primarily carbon dioxide and water vapor, absorb energy in the IR radiation frequency spectrum. Because the amount of carbon

dioxide in the air is fairly constant, its effect on detection range is constant and need not be considered by the gunner. Water vapor, however, varies widely with geographic location and local weather conditions and can adversely affect Redeye engagement capabilities. In general, the higher the humidity, the shorter the range of IR radiation acquisition. Other particles in the atmosphere, such as dust, smoke, fog, and rain, will absorb and scatter IR radiations and reduce IR acquisition ranges.

(4) Background Radiations.--All objects emit some degree of energy in the IR radiation frequency spectrum. The sun is an extremely strong source of IR radiation and must be avoided when firing the Redeye weapon. If the sun's direct rays enter the field of view of the seeker, it will track the sun rather than the target. The sun's IR radiation is also reflected from objects, causing these objects to become secondary sources of background radiation. Typical secondary sources are bodies of water, bare hillsides, and white clouds. Some sources of secondary background radiation are shown in figure 38. The Redeye IR radiation seeker can discriminate between radiations from small point sources, such as the tailpipe of a jet, and large background sources, such as clouds and terrain. With the exception of the sun, the hot metal parts of the engine exhaust system of the target are usually the smallest and hottest objects in the environment and, therefore can be acquired and tracked by the missile seeker.

2305. RANGE TECHNIQUES AND RANGE RING PROFILES

Two important procedures in using the

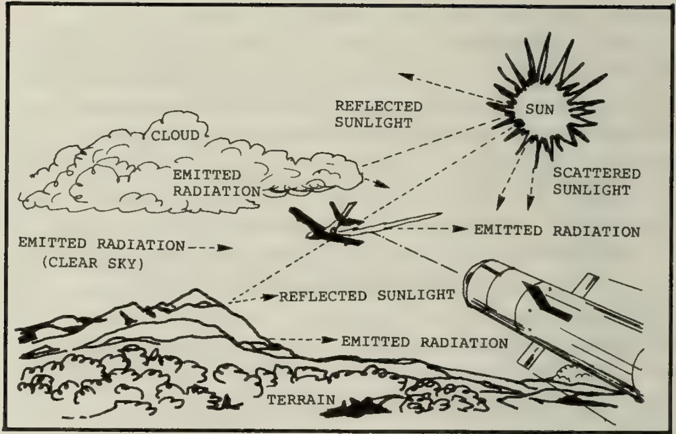


Figure 38.--Background Radiations.

Redeye weapon are proper use of the sight and estimation of the target range. Proper use of the sight requires practice. Range estimation requires a knowledge of aircraft sizes, and distance-size relationships, using the sight. Target ranging is accomplished by the use of the range ring located within the sight.

a. Sight Description

(1) Launcher Sight.--The launcher sight is used to aid the gunner in acquiring and ranging the target. In addition, the sight provides a means of introducing super-elevation (and lead if required).

(2) Sight Reticle.--The open sight of the Redeye weapon, as viewed by the gunner

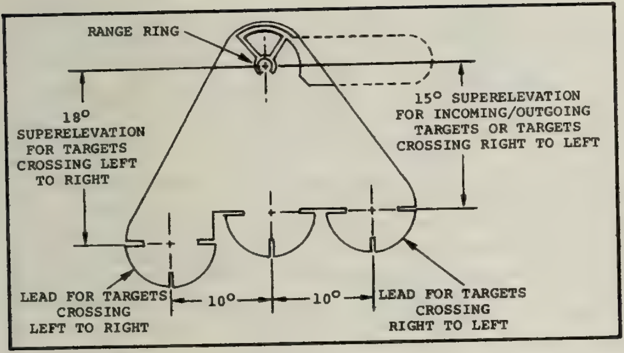

RANGE RING
18° SUPERELEVATION FOR TARGETS CROSSING LEFT TO RIGHT
15° SUPERELEVATION FOR INCOMING/OUTGOING TARGETS OR TARGETS CROSSING RIGHT TO LEFT
LEAD FOR TARGETS CROSSING LEFT TO RIGHT
10°
10°
LEAD FOR TARGETS CROSSING RIGHT TO LEFT

Figure 39.--Diagram of Open Sight Assembly (M41E2).

(see fig. 39), consists of a front range ring, a middle aperature with three semicircular openings below, and a rear peepsight. The peepsight is located at the rear of the sight and used by the gunner to properly aline the other elements. The small range ring is located at the forward end of the sight and used by the gunner to estimate the range of a target. The three semicircular rings provide for insertion of superelevation and lead angle.

(3) Range Ring.--Within the gunner's field of view, the range ring is 10 mils in diameter and has a notch 2.5 mils wide at the bottom. The range ring is boresighted so the caged missile seeker will be centered on the target that the gunner is visually tracking. The range ring is used by the gunner to aline the launch tube directly with the target as well as to determine target range.

b. Target Ranging.--The Redeye firing decision depends on the gunner determining when the target is within the effective launch zone of the missile. This decision requires a knowledge of the type of target being engaged and the ability to range the target. The Redeye sight pattern can be used in determining target range. Ranging with the Redeye sight is performed by measuring the size of the target in relation to the sight range ring. When the target image is superimposed on the sight range ring, the target image size will change as the range to the target increases or decreases. The target size as seen by the gunner through the range ring is, therefore, related to target range. The gunner forms a mental profile of the various representative low-medium and high performance aircraft and applies these profiles to the range ring to solve ranging problems.

(1) Use of the Range Ring Profiles.--The target width as seen through the range ring is expressed as one-half range ring diameter, one-third range ring diameter, etc. The Redeye gunner need only determine the space the target image covers in the range ring. A target image will appear greater than the diameter of the range ring as range to the target decreases. This can be expressed as twice the range ring diameter or three times the range ring diameter. Example of two types of helicopters at various ranges and a high performance jet aircraft are shown in figures 40 and 41.

(2) Maps and Range Cards.--A military map can be used for determining distance. The map is used to plot distances to various

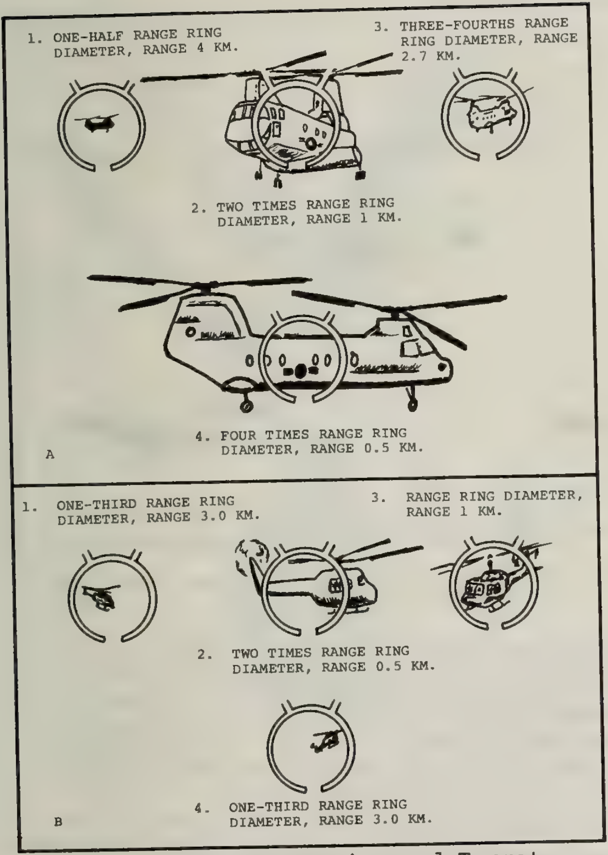
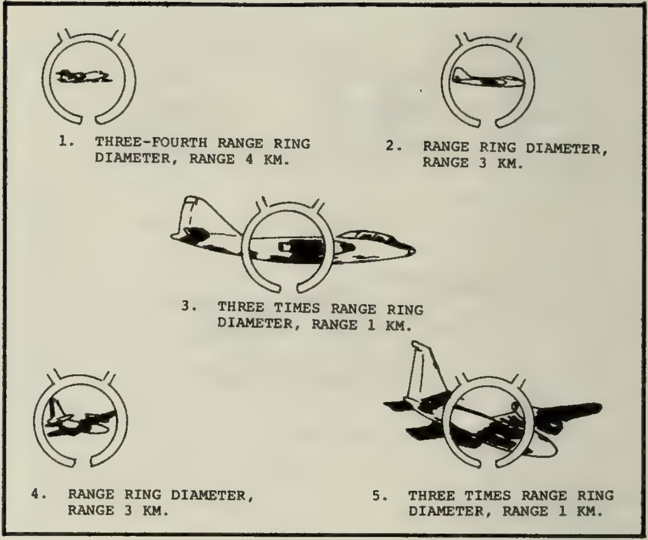

1. ONE-HALF RANGE RING DIAMETER, RANGE 4 KM.
3. THREE-FOURTHS RANGE RING DIAMETER, RANGE 2.7 KM.
2. TWO TIMES RANGE RING DIAMETER, RANGE 1 KM.
4. FOUR TIMES RANGE RING DIAMETER, RANGE 0.5 KM.
A
1. ONE-THIRD RANGE RING DIAMETER, RANGE 3.0 KM.
3. RANGE RING DIAMETER, RANGE 1 KM.
2. TWO TIMES RANGE RING DIAMETER, RANGE 0.5 KM.
4. ONE-THIRD RANGE RING DIAMETER, RANGE 3.0 KM.
B

Figure 40.--Range Ring and Target Profile of Helicopters.



1. THREE-FOURTH RANGE RING DIAMETER, RANGE 4 KM.

2. RANGE RING DIAMETER, RANGE 3 KM.

3. THREE TIMES RANGE RING DIAMETER, RANGE 1 KM.

4. RANGE RING DIAMETER, RANGE 3 KM.

5. THREE TIMES RANGE RING DIAMETER, RANGE 1 KM.

Figure 41.--Range Ring and Target Profiles of Attack Bomber.

landmarks or terrain features. When team personnel are oriented with a military map and know approximate distances to various landmarks, it is a simple matter to construct a range card. (See fig. 42.) The purpose of the range card is to enable the FAAD gunner to have a ready reference to various ranges within view of the position. By knowing the capabilities and limitations of the weapon and the ranges of various landmarks and objects, the gunner can readily determine if a target

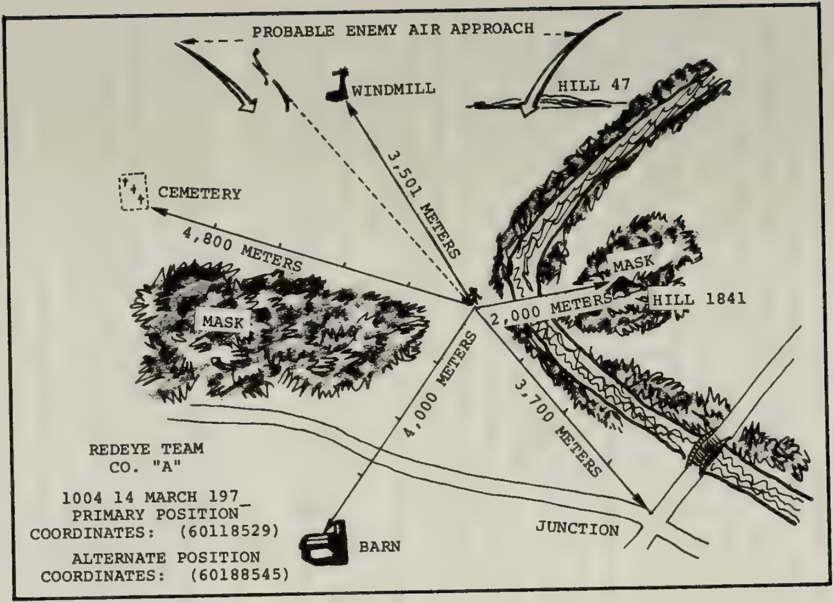


Figure 42.--Typical Range Card.

can be engaged. Targets to be engaged by Redeye teams generally will be operating at low altitudes. Accordingly, the slant range (line of sight distance) to these targets will be only slightly greater than the horizontal range (the distance to a point in the horizontal plane directly below the target). This difference is not considered consequential.

(3) Other Ranging Aids.--Other aids for estimating ground distance to distant objects are binoculars, Redeye weapon long ring, and the gunner's hand. These aids are used to supplement data more easily obtained from maps when maps are not available. The gunner may sight an object with binoculars or through the range ring of the weapon and, by using the range ring profiles previously described, find the range of specific landmarks or temporary objects located on the ground within view of the position. The use of the hand, fingers, or thumb may also be used to estimate range. FM 6-135, Adjustment of Artillery Fire by the Combat Soldier, describes the process.

2306. CONDUCT OF FIRE

a. General.--The gunner must know the general target characteristics and the best weapon employment techniques to maximize effectiveness of the Redeye weapon. This section discusses gunner techniques of fire combined with the functional steps of weapon firing procedure, factors which govern the gunner's decision to activate the weapon, hold fire, resume fire, and cease fire. The information contained in target detection and search and scan procedures explained how the gunner visually detected the target and infrared acquisition explained how the target was acquired. Ranging techniques explained how, if the target is hostile, the gunner ranges to determine whether it can be engaged or not. The gunner must study the material in this section and the material in FM 23-17A, Redeye Guided Missile System (U), to gain and maintain an understanding of Redeye employment techniques.

(1) Gunner Skills.--Gunner skills are directly related to training and are developed and measured in the following areas:

(a) Identification and recognition of aircraft by visual means.

(b) Evaluation of the threat and engagement probability in consideration of the target, type, path, speed, range, and IR radiation characteristics.

(c) Preparation of the weapon for firing.

(d) Determination of the area in which aircraft can be acquired by the Redeye weapon based upon target IR radiation characteristics, speed, course, aspect, and weapon seeker capabilities.

(e) Positioning the weapon to the estimated acquisition area, ranging, and electrically energizing (warmup) the weapon at the proper time. The warmup time decision considers the limited launcher BCU life, the time of entry of the target into the acquisition zone, and the time until the missile can be launched.

(f) Acquisition of the target after entry into the probable acquisition zone by pointing the weapon so that the sight range ring is held on the target. The tone from the audio acquisition indicator is used to determine if IR radiations from the target are being received.

(g) Uncaging switch activation followed by ensuring the seeker is tracking the target by listening to the changed audible tone output from the weapon.

(h) Alternate procedures if IR radiation is lost between uncage and activation of the fire trigger which involves recaging and attempting to reacquire the target.

(i) Determination of requirement to lead the target and direction of lead based on target course, speed, and range. Insertion of superelevation (and lead angle in the correct direction if required).

(j) Determination of optimum firing time to ensure maximum probability of an effective engagement.

(k) Activation of the firing trigger at the proper time and holding the trigger and maintaining superelevation and lead until launch while maintaining track (follow-thru).

(2) Activate.--The "activate" zone encompasses the entire area within which the target may be when the gunner should activate the weapon. The determination of the "activate" zone is very important in technique of fire on all targets. A high-speed target will be in the launch zone for a short period of time and the activation zone has been established to allow weapon warmup prior to launch. For specific explanation of "activate" zones, see FM 23-17A, Redeye Guided Missile System (U). The gunner is able to determine the activation zone for a specific target engagement after determination of target track and

track type. The gunner must activate the weapon at least 3 to 5 seconds before the target comes within IR acquisition range. When preparing to engage a low-medium or high performance target, the gunner will activate the weapon as soon as he determines the target is within the activation zone. If the BCU life is exceeded, he may still continue the engagement by inserting a new BCU in the weapon.

(3) Launch.--The missile launch zone defines the volume of space within which the target may be successfully engaged. The target must be within the launch zone defined by the missile performance boundaries, and positive IR acquisition must be achieved. The size and shape of the launch zones and their location with respect to the gunner will vary with target speed and altitude. Launch for low-medium performance aircraft may take place as soon as the target is within the determined launch limits and IR acquisition has occurred. If the low-medium performance target is within the launch zone and IR acquisition has not occurred prior to the end of the BCU life, the gunner must use another BCU. The optimum time for missile launch for high-performance aircraft is a function of crossover point and IR acquisition. If IR acquisition occurs prior to crossover, the gunner will uncage the gyro, insert superelevation (and lead if required), and fire in accordance with the applicable engagement procedures for an incoming-overhead target. If IR acquisition occurs after crossover, the gunner will then perform the firing sequence as quickly as possible. The gunner's determination as to when to hold fire and resume fire are functions of weapon capabilities and limitations and are

described in the techniques of fire rules found in FM 23-17A, Redeye Guided Missile System (U).

(4) Cease Fire.--At the point along the aircraft course when the gunner estimates the target to be outside the launch zone, he must cease fire. This estimate is based on the gunner's ability to range the target with the Redeye weapon sight.

b. Firing Technique for Engaging Low-Medium Performance Targets

(1) Typical Low-Medium Performance Characteristics.--The identifying characteristics of typical low-medium performance aircraft are as depicted in figure 43.

(2) Technique of Fire Rules.--For engagement of this type of target, the gunner may refer to technique of fire rules and performance capability as described in FM 23-17A, Redeye Guided Missile System (U).

(3) Engagement Sequence.--Figure 44 shows the sequence of events in the engagement of a low-medium performance target. The engagement should proceed as follows:

(a) Visual Detection.--The gunner searches and scans for aircraft. When the aircraft is detected, gunner visually tracks the aircraft and readies the weapon.

(b) Determination of Aircraft and Track Type.--Gunner classifies aircraft by performance type and track. Target track type is determined to be incoming-crossing, outgoing-crossing, incoming-overhead, or outgoing-overhead.

(c) Acquisition of Target in Sight Range Ring.--Gunner shoulders the weapon, points it in the direction of the target, and usually acquires the target in the sight range ring. He begins tracking and ranging

DIMENSIONS

1. Propeller (Small):

Wingspan	10 meters
Length of fuselage	10 meters

2. Propeller (Large):

Wingspan	30 meters
Length of fuselage	25 meters

3. Helicopter (Small):

Cabin width	1-3 meters
Length of fuselage	10 meters

4. Helicopter (Large):

Cabin width	3-6 meters
Length of fuselage	20 meters

CRUISING SPEED

0-300 knots

IR CHARACTERISTICS

Incoming, outgoing, and crossing.

Figure 43.--Dimensions and Characteristics of Typical Low-Medium Performance Aircraft.

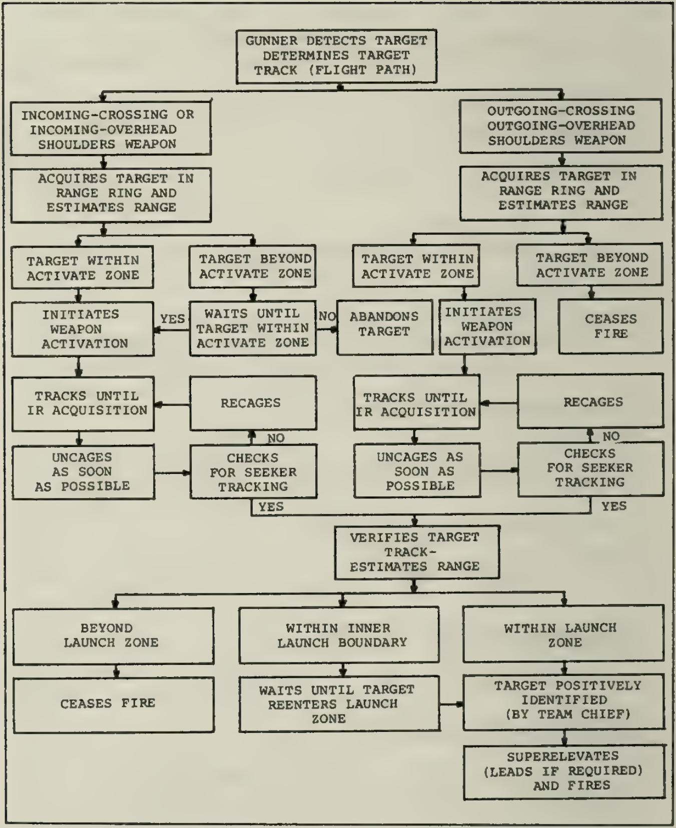

GUNNER DETECTS TARGET DETERMINES TARGET TRACK (FLIGHT PATH)
INCOMING-CROSSING OR INCOMING-OVERHEAD SHOULDERS WEAPON
OUTGOING-CROSSING OUTGOING-OVERHEAD SHOULDERS WEAPON
ACQUIRES TARGET IN RANGE RING AND ESTIMATES RANGE
ACQUIRES TARGET IN RANGE RING AND ESTIMATES RANGE
TARGET WITHIN ACTIVATE ZONE
TARGET BEYOND ACTIVATE ZONE
TARGET WITHIN ACTIVATE ZONE
TARGET BEYOND ACTIVATE ZONE
INITIATES WEAPON ACTIVATION
YES
WAITS UNTIL TARGET WITHIN ACTIVATE ZONE
NO
ABANDONS TARGET
INITIATES WEAPON ACTIVATION
CEASES FIRE
TRACKS UNTIL IR ACQUISITION
RECAGES
TRACKS UNTIL IR ACQUISITION
RECAGES
NO
NO
UNCAGES AS SOON AS POSSIBLE
CHECKS FOR SEEKER TRACKING
UNCAGES AS SOON AS POSSIBLE
CHECKS FOR SEEKER TRACKING
YES
YES
VERIFIES TARGET TRACK-ESTIMATES RANGE
BEYOND LAUNCH ZONE
WITHIN INNER LAUNCH BOUNDARY
WITHIN LAUNCH ZONE
CEASES FIRE
WAITS UNTIL TARGET REENTERS LAUNCH ZONE
TARGET POSITIVELY IDENTIFIED (BY TEAM CHIEF)
SUPERELEVATES (LEADS IF REQUIRED) AND FIRES

Figure 44.--Engagement Procedures for Low-Medium Performance Target.

the target (using the methods described in target ranging and the criteria specified in FM 23-17A, Redeye Guided Missile System (U)) to determine target position in relation to the activation zone. When an incoming target is estimated to be beyond the activation zone, the gunner waits until the target is within the activation zone to activate the weapon. When the target is outgoing beyond the activation zone, the gunner does not activate the weapon.

(d) Activation.--The gunner activates the weapon when the target is estimated to be within the activation zone. Most low-medium performance aircraft have IR radiation characteristics which allow the gunner to acquire them from both an incoming and outgoing aspect. The gunner must recall the range ring profile of the specific type (large-small) target in relation to the activation zone. When the gunner activates the weapon, it takes it approximately 3 to 5 seconds to warm up. During warmup, the gunner continues to track the target in the range ring.

(e) IR Acquisition.--The weapon is capable of detecting IR radiation 3 to 5 seconds after activation. The gunner tracks the target in the range ring with the gyro in the caged condition until IR acquisition is achieved. When this occurs, he uncages the gyro as soon as possible by pressing and holding the uncaging switch. The gunner ensures the seeker is tracking and, if the audible tone is good, continues to track the target. If seeker tracking is not obtained or is lost, the gunner releases the uncaging switch which recages the gyro and continues to track the target. When IR acquisition is again attained, he uncages and checks for seeker tracking.

(f) Verification of Target Track.--The gunner verifies the latest target direction to determine whether the target is on the same course or has altered its initial course.

(g) Range Estimation, Incoming.--If the aircraft is incoming and the gunner determines that it is in the launch zone, he proceeds with the engagement firing sequence. If the gunner determines it is outside the launch zone and inside the inner launch boundary, he waits until the target passes the inner launch boundary and enters the launch zone and then proceeds with the firing sequence.

(h) Range Estimation, Outgoing.--If the aircraft is outgoing and the gunner determines that it is in the launch zone, he proceeds with the engagement firing sequence. If the gunner determines the target is inside the inner launch boundary, he waits until the target reenters the launch zone and continues the firing sequence. If the gunner determines the outgoing target is beyond the launch zone, he ceases the engagement.

(i) Positive Identification.--The team leader positively identifies the aircraft as hostile and notifies the gunner. Final positive identification must take place prior to the firing stage.

(j) Superelevation, Lead, and Fire.--When the gunner determines that the target is within the launch zone, he uncages and inserts superelevation (and lead if required). If the acquisition tone is good, the gunner presses and holds the firing trigger until after missile ejection, ensuring that he continues to track the target (follow-thru).

c. Firing Technique for Engaging a High-Performance Target

(1) Typical High-Performance Aircraft Characteristics.--The identifying characteristics of a typical high-performance aircraft are as depicted in figure 45.

(2) Technique of Fire Rules.--For engagement of this type of target, the gunner may refer to detailed technique of fire rules,

DIMENSIONS

1. Small Jet Aircraft:

Wingspan	10 meters
Length of fuselage	15 meters

2. Large Jet Aircraft:

Wingspan	25 meters
Length of fuselage	30 meters

GROUND ATTACK SPEED DURING CLOSE-IN GROUND SUPPORT

About 300 knots (150 meters per second)

IR CHARACTERISTICS

Incoming-crossing and outgoing.

Figure 45.--Dimensions and Characteristics of Typical High-Performance Aircraft.

performance capabilities; range ring, and target profiles, illustrated in FM 23-17A, Redeye Guided Missile System (U).

(3) Engagement Sequence.--Figure 46 shows the sequence of engagement of a high-performance target. The incoming-crossing, outgoing-crossing, and outgoing-overhead target engagement should proceed as follows:

(a) Visual Detection.--The gunner searches and scans for aircraft. When the aircraft is detected, the gunner visually tracks the aircraft. The weapon should be readied prior to engagement as described in section 4 of this chapter.

(b) Determination of Aircraft and Track Type.--The gunner classifies the aircraft by performance type and track. Target track is determined to be incoming-crossing, outgoing-crossing, incoming-overhead, or outgoing-overhead. The gunner makes an estimate of target track to determine the crossover line prior to tracking the target and applies the right angle fire delay rule, if applicable. An engagement procedure for engaging incoming-overhead targets is described below.

(c) Acquisition of Target in Sight Range Ring.--The gunner shoulders the weapon, points it in the direction of the target, and visually acquires the target in the range ring. He begins tracking and ranging the target to determine target range in relation to the activation zone. When an outgoing-crossing or outgoing-overhead target is estimated to be beyond the incoming activation zone, the gunner waits for the target to be in the incoming activation zone. When an outgoing-crossing target is estimated to be

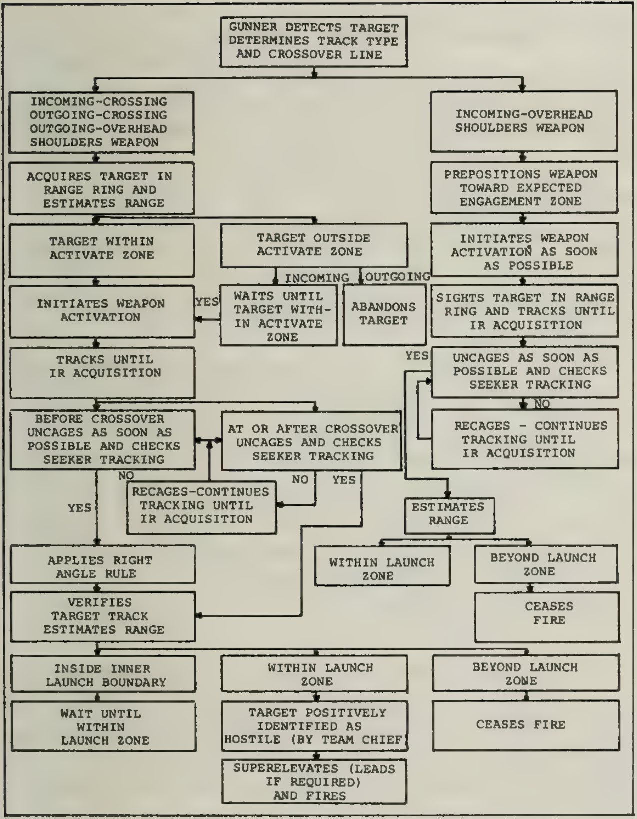

GUNNER DETECTS TARGET DETERMINES TRACK TYPE AND CROSSOVER LINE
INCOMING-CROSSING OUTGOING-CROSSING OUTGOING-OVERHEAD SHOULDERS WEAPON
INCOMING-OVERHEAD SHOULDERS WEAPON
ACQUIRES TARGET IN RANGE RING AND ESTIMATES RANGE
PREPOSITIONS WEAPON TOWARD EXPECTED ENGAGEMENT ZONE
TARGET WITHIN ACTIVATE ZONE
TARGET OUTSIDE ACTIVATE ZONE
INITIATES WEAPON ACTIVATION AS SOON AS POSSIBLE
INCOMING
OUTGOING
INITIATES WEAPON ACTIVATION
YES
WAITS UNTIL TARGET WITHIN ACTIVATE ZONE
ABANDONS TARGET
SIGHTS TARGET IN RANGE RING AND TRACKS UNTIL IR ACQUISITION
TRACKS UNTIL IR ACQUISITION
YES
UNCAGES AS SOON AS POSSIBLE AND CHECKS SEEKER TRACKING
NO
BEFORE CROSSOVER UNCAGES AS SOON AS POSSIBLE AND CHECKS SEEKER TRACKING
AT OR AFTER CROSSOVER UNCAGES AND CHECKS SEEKER TRACKING
RECAGES - CONTINUES TRACKING UNTIL IR ACQUISITION
NO
NO
YES
RECAGES-CONTINUES TRACKING UNTIL IR ACQUISITION
YES
ESTIMATES RANGE
WITHIN LAUNCH ZONE
BEYOND LAUNCH ZONE
APPLIES RIGHT ANGLE RULE
CEASES FIRE
VERIFIES TARGET TRACK ESTIMATES RANGE
INSIDE INNER LAUNCH BOUNDARY
WITHIN LAUNCH ZONE
BEYOND LAUNCH ZONE
WAIT UNTIL WITHIN LAUNCH ZONE
TARGET POSITIVELY IDENTIFIED AS HOSTILE (BY TEAM CHIEF)
CEASES FIRE
SUPERELEVATES (LEADS IF REQUIRED) AND FIRES

Figure 46.--Engagement Procedures for High-Performance Target.

outside the outgoing activation zone, the gunner does not activate the weapon.

(d) Activation.--The gunner activates the weapon when the target is estimated to be within the activation zone. This allows the weapon sufficient warmup time to enable the weapon to acquire the target prior to crossover, if sufficient IR energy is radiated from the target. During warmup, the gunner continues to track the target in the range ring. The gunner must recall the range ring profile on the specific type target in relation to the activation zone so that he can estimate when the target is within the "activate" zone.

(e) IR Acquisition.--When the target has not passed the crossover point and IR radiation is acquired, the gunner uncages the gyro as soon as possible. The gunner checks seeker tracking and, if the audible tone is good, continues to track the target. When seeker tracking is not obtained or is lost (audible tone is not good), the gunner releases the "uncage" switch, reestablishes tracking, and repeats the sequence, until IR radiation is acquired. This procedure is valid prior to and after target reaches the crossover point.

(f) Verification of Target Track.--The gunner applies the right angle rule (see FM 23-17A, Redeye Guided Missile Missile System (U)) and determines whether the target is on the same course or has altered its initial course. If the target track has changed, the gunner must then use the engagement procedures applicable to the new target track. (See fig. 46.)

(g) Range Estimation.--Range

estimation procedures are the same as for low-medium performance aircraft.

(h) Positive Identification.--The team leader positively identifies the aircraft as hostile and notifies the gunner. Final positive identification must take place prior to the firing stage.

(i) Superelevation, Lead, and Fire.--As soon as the gunner determines the target is within the launch zone and the target has been positively identified as hostile, he inserts superelevation (and lead as required). If the acquisition tone is good, the gunner presses and holds the firing trigger, continues to track the target until after the missile ejects. The gunner must ensure he follows through with the target track until after missile ejection.

(4) Engagement Sequence (Incoming-Overhead Target Track).--In a typical engagement of a high-performance target on an incoming-overhead target track, the target will be engaged on its outgoing course after it has passed close to (within 500 meters) or over the gunner's position. This engagement (see fig. 47) should proceed as follows:

(a) Visual Detection.--When the aircraft is detected, the gunner visually tracks aircraft and tentative identification of aircraft as hostile is made by the team leader.

(b) Determination of Aircraft and Type of Track.--The gunner determines the aircraft to be a jet. He also determines the size of aircraft as to whether it is large or small. Target track is determined to be incoming-overhead.

(c) Preposition.--While

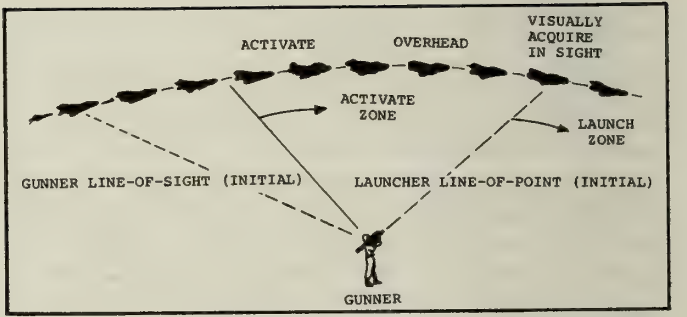


Figure 47.--Preposition Technique for Incoming-Overhead High-Performance Target.

visually tracking the target (without using the sight), the gunner shoulders the weapon. For incoming-overhead targets (i.e., targets within 500 meters of gunner's position or directly overhead), the gunner should not attempt to track the incoming target with the sight. For this type of target, the gunner should aim the weapon in the outgoing direction toward the anticipated launch zone (see fig. 47).

(d) Activation.--The gunner initiates warmup as soon as possible after prepositioning.

(e) IR Acquisition.--As the incoming-overhead target passes beyond the crossover point or over the gunner's position, the gunner establishes weapon track. The gunner tracks the target in the sight range ring with the gyro in caged position until IR radiation is acquired. Whe IR acquisition is achieved, the gunner uncages the gyro. If seeker tracking is lost, the gunner recages the gyro, continues to track the target until IR radiation is reacquired, and uncages the gyro again.

(f) Range Estimation.--The gunner determines whether the target is inside or outside the launch zone. If target range is determined to be greater than effective launch range, he ceases engagement. When the gunner determines the target is within effective range, he proceeds with the firing sequence.

(g) Positive Identification.--The team leader positively identifies the aircraft as hostile and notifies the gunner. Final positive identification must take place prior to the firing stage.

(h) Superelevation, Lead, and Fire.--When the gunner determines the target is within the launch zone, he inserts superelevation (and lead as required). If the seeker tracking tone is good, the gunner presses and holds the firing trigger and continues to track (follow-thru) until after missile ejection.

d. Multiple Targets.--During attacks by multiple aircraft, the team leader coordinates the fire of both team members to ensure that the greatest threat is engaged first. During multiple aircraft attacks, the team leader and the gunner initiate and continue the identification process throughout the engagement.

Section IV. FIRING PROCEDURES

2401. INTRODUCTION

A complete, smoothly executed firing sequence is an absolute requirement in the use of the Redeye missile system. The gunner must know the firing sequence and perform it automatically to be successful. Operation of the weapon consists essentially of:

a. Removing the cap assembly and receptacle cap and inserting the BCU in the launcher.

b. Commencing visual tracking and ranging.

c. Activating the weapon when the target enters the activation zone by operating and releasing the safety and actuator device and continuing to track.

d. Acquiring the target.

e. Uncaging the gyro.

f. Applying superelevation (and lead as required).

g. Pressing and holding the firing trigger.

h. Continuing to track.

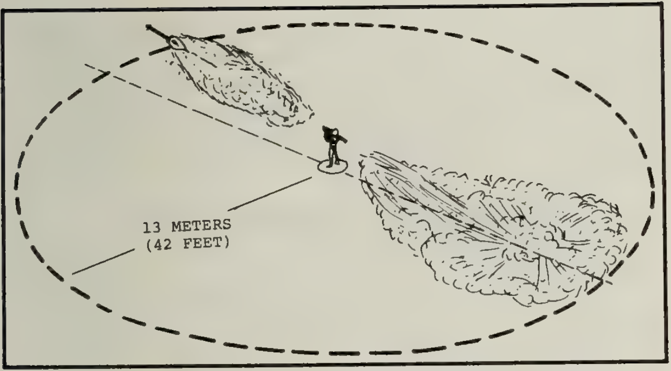


Figure 48.--Firing Area Safety Diagram.

2402. FIRING INSTRUCTIONS

a. Precautions Prior to Firing.--Safety precautions which the gunner must observe prior to firing are:

(1) Ensure that the launcher area is clear of personnel and equipment for a radius of at least 13 meters behind the weapon (see fig. 48). If team members are separated by less than 13 meters in a tactical situation, the gunner not engaging the target is responsible for staying outside the weapon backblast hazard area.

(2) Never fire with launcher elevated more than 65 degrees (after superelevation is applied).

(3) Do not fire from a kneeling or prone position; fire from a standing position only.

(4) A plastic eyeshield attached to

the weapon and the sight reticle afford eye protection during firing. In nontactical firings, helmet, flak jacket, and ear protection devices are mandatory. The following paragraphs explain the step-by-step procedures that the gunner follows in firing the Redeye weapon. The exact sequence of steps may vary with the tactical situation.

2403. BCU RECEPTACLE CAP REMOVAL AND REPLACEMENT

The Redeye weapon is shipped with a receptacle cap in the launcher BCU receptacle to keep the launcher electronic contacts clean. The cap should be kept in place until a BCU is inserted. Remove the receptacle cap by twisting it counterclockwise; replace by reversing this procedure.

2404. VISUAL TRACKING AND TARGET RANGING

The gunner visually tracks the target and determines if it is within range of the weapon. Range to the target is estimated, using the sight range ring inside the sight assembly. (See fig. 39.) A detailed explanation of range estimation (target ranging) is provided in section 3 of this chapter.

2405. WEAPON ACTIVATION AND WARMUP

The gunner presses the safety and actuator device which activates the BCU for launcher power. It takes approximately 3 to 5 seconds for the weapon to warm up. The location of the activation zone varies with the type of target, its velocity, and its flight path.

2406. TARGET ACQUISITION

When the gunner positions the sight so that the target appears in the center of the range ring, an audible and vibrating signal provides an indication that the missile seeker has acquired a target. If the target is within effective range and steady target acquisition signals are received, the gunner proceeds with the firing sequence. Two conditions must be present for the missile seeker to acquire target infrared radiation:

a. The weapon must be activated and pointed at the target.

b. The infrared radiation from the target must be sufficiently strong.

2407. UNCAGING SWITCH

The seeker, when caged, is aligned with the sight range ring for target acquisition and must be released to automatically track a moving target before superelevation (and lead if required) is inserted. The uncaging switch uncages the gyro. The uncaging switch will not be activated until after the missile seeker has acquired the target. When uncaged and tracking, a distinct seeker-tracking sound is normally audible. The uncaging switch also acts as a safety interlock to prevent the missile from being fired until both the uncaging switch and firing trigger are activated.

2408. SUPERELEVATION AND LEAD

a. Superelevation is introduced to

compensate for missile tipoff, caused by gravity during the period between missile ejection and sustainer ignition. Lead must be inserted for all crossing targets to minimize missile maneuver.

(1) With the gyro uncaged and the seeker tracking the target, the gunner positions the target image in one of the three lower semicircles under the range ring to introduce superelevation, and lead if required. Superelevation and lead help to establish a missile attitude that is more nearly on the line of sight to the target after missile launch, and prevents the missile from impacting the ground when fired at low-flying targets.

(2) For crossing targets, the gunner inserts 10 degrees lead to reduce the initial missile maneuver required for target interception. For a target crossing from left to right, the gunner positions the launcher so as to center the target in the lower left semicircle of the sight. For a target crossing from right to left, the gunner centers the target image in the lower right-hand semicircle of the sight. The target must always appear to fly toward the middle superelevation ring after superelevation has been inserted, never away from it. No lead is required for straight incoming or outgoing targets. For these targets, the gunner centers the target image in the middle circle of the three lower semicircles of the sight.

(3) The right and center semicircular positions (see fig. 39) allow the gunner to superelevate the weapon 15 degrees. The left position, used for left to right crossing targets, allows the gunner to superelevate the weapon 18 degrees. Precise centering of the

target is not necessary.

2409. INTERRUPTING THE FIRING SEQUENCE

a. Since the normal life of the BCU is at least 30 seconds, the firing sequence may be interrupted for reacquisition of the target after the safety and actuator device has been pressed, if the firing trigger has not been pressed within this time period. The gunner then replaces the BCU before engaging another target. If the Redeye weapon is not to be used again, the receptacle cap and cover are replaced.

b. After the gyro is uncaged, and the audible acquisition signal is lost, the uncaging switch is released and the gunner attempts to reacquire the target.

2410. FIRING TRIGGER

With the uncaging switch held down, pressing and holding the firing trigger activates the thermal battery and the delay circuit in the missile. The delay allows the missile battery to reach nominal output voltage before launcher power is removed and the missile is fired.

2411. LAUNCHER BATTERY/COOLANT UNIT REPLACEMENT

Warning: Parts of the launcher BCU get extremely hot (400 degrees Fahrenheit) when activated and stay too hot to touch for approximately 15 minutes. Do not touch the case of a hot BCU when removing it from the BCU receptacle.

a. To remove the launcher BCU, grasp the heat-insulated cap and twist it counterclockwise. After use, it may be discarded. Before replacing the launcher BCU, make certain that the safety and actuator device is in the safe position.

b. To replace a launcher BCU, insert it in the launcher BCU receptacle and twist it clockwise until it locks in place.

Section V. SAFETY

2501. PURPOSE

The purpose of this section is to summarize general safety procedures used during shipping, storage, handling, checking, and firing of the Redeye weapon.

2502. SHIPPING AND STORAGE

The weapon will never be shipped or stored with the BCU inserted. The BCU receptacle cap and front cover are installed and the weapon placed in the shipping and storage container prior to shipment or storage.

2503. HANDLING

While the weapon can be damaged if dropped or handled carelessly, detonation of the warhead or ignition of the motors as a result of such mishandling will not normally occur. If the weapon is dropped or there is evidence that it has been subjected to rough handling during shipment, it should be returned to the ammunition supply point. Weapons considered unsafe for shipment will be destroyed.

2504. FIRING

a. Safety Equipment.--In addition to his helmet, the gunner is required to wear a flak jacket to ensure protection under nontactical conditions.

b. Flying Debris.--Flying debris is a hazard to the gunner during firing if the launcher breech is closer than 1 meter to the ground or an obstacle is directly to the rear of the gunner. Debris from sustainer ignition at the end of the coast phase does not normally endanger the gunner in any way.

c. Ear Protection.--Under nontactical conditions, ear protection is required to prevent the gunner from suffering a temporary hearing loss as a result of being exposed to the noise of the ejector and sustainer motors at ignition. Plugs are available in the supply system for this purpose.

d. Additional Precautions.--Personnel should stay clear of the front window of the missile. There have been incidents of outward explosion of the front window caused by internal gas leaks.

2505. FIRING ANGLE LIMITATIONS

Never fire the Redeye weapon from a kneeling or prone position. Fire only from the standing position and never from a foxhole or in front of an obstacle.

a. Maximum Firing Elevation Angle.--The weapon should never be fired at a launcher elevation angle greater than 65 degrees. If firing is done at an elevation angle greater than 65 degrees, the blast from the ejector motor may cause earth and stone particles to fly upward and cause injury to the legs and body of the gunner.

b. Minimum Firing Elevation Angle.--Because the Redeye missile tends to lose altitude during the coast phase after launch, the launcher must be elevated to a minimum elevation angle of 15 degrees before firing on level or near level terrain. Whenever tactically possible, the gunner should take a firing position on elevated terrain to obtain a clear field of fire. An elevated firing position will tend to reduce the possibility of the missile hitting the ground after launch when firing at low altitude targets which bring the launcher line of sight below the horizon.

2506. BATTERY/COOLANT UNIT

The BCU case becomes extremely hot (400 degrees) after activation and should not be touched for 15 minutes after it has been activated except on the heat-insulated ring. The launcher uses a thermal battery to power the Redeye weapon during prelaunch operation. Removal of the battery/coolant unit from the launcher can be safely done by grasping the heat-insulated ring on the bottom of the unit. Do not place the hand under the activated BCU. Grasp the sides of the insulated ring for removal.

2507. HANGFIRES, MISFIRES, AND DUDS

a. If the weapon does not function properly when the firing trigger is depressed and held down for 0.6 seconds (i.e., if the missile is not ejected from the launcher), continue to track the target for an additional 3 seconds with the firing and uncaging switches depressed. If the weapon has not fired at the end of this time, keep the weapon pointed downrange, release the uncaging and firing switches and remove the launcher BCU. Keep the weapon oriented in a safe launch position for 10 minutes to preclude any hazard due to a hangfire. After this 10-minute wait, contact EOD personnel to deactivate the weapon.

b. In instances when the missile is ejected from the launcher and the sustainer motor fails to fire, the round should not be approached and personnel should be directed to take cover. After a 30-minute period, the round can be considered safe and should be destroyed in place.

c. Should the missile be successfully launched (ejector and sustainer motors fire) but strike the ground without self-destruction, the area should be cleared of personnel and it should be destroyed in place.

d. When the weapon must be destroyed, the services of the Explosive Ordnance Disposal Unit should be requested. Destruction should be complete so as to prevent information regarding the missile being obtained by analysis of the debris.

2508. SPECIAL OPERATING PRECAUTIONS

a. Radio Frequency Energy.--The probability of accidental detonation of the warhead by static electricity or radio frequency is extremely small. However, the weapon should not be stored, handled, or fired in areas containing high levels of radio frequency energy. Shipboard operations require special modifications to the weapon because of this fact.

b. Weapon Movement.--Whether movement is by air, sea, rail, or motor vehicle, the weapon should be placed in a shipping and storage container (Monopak) prior to movement.

c. Battery/Coolant Hazard.--It is highly unlikely that the thermal battery inside the BCU could be accidentally activated. However, to ensure high safety standards, the batteries should not be exposed to direct high-power radio frequency energy or stored near flammable material.

Section VI. DESTRUCTION

2601. GENERAL

Destruction of the Redeye weapon or its components is performed by the FAAD team. This action is taken when, in the judgment of the FAAD unit commander, it is warranted.

a. When destruction is directed, due consideration should be given to selecting a site of destruction that will not create a hazard to friendly troops. The weapon must be destroyed so that it cannot be repaired with components from other weapons. Adequate destruction requires that key components be destroyed or damaged beyond repair. However, when circumstances prevent destruction of all key components, destruction priority shall be given to those components most difficult to replace. The seeker head must receive top priority during destruction and must be destroyed on each weapon so that the enemy cannot reconstruct one complete weapon from several damaged ones.

b. The missile can best be destroyed by firing the Redeye weapon. When the weapon cannot be fired, destruction by other means is required. In general, destruction of the essential components, followed by burning, usually renders the Redeye weapon inoperable. However, selection of the particular destruction method requires resourcefulness in the use of facilities at hand.

(1) Destruction By Burning

(a) Physically smash the seeker.

(b) Physically smash the sight and handgrip assembly.

(c) Stack all materiel to be burned.

(d) Place incendiary grenades around the Redeye weapon(s), or douse with flammable liquids.

(e) Cautiously ignite.

Warning: The Redeye weapon contains both a live rocket motor and a high-explosive (HE) warhead. The presence of explosives creates an extreme hazard to personnel when the weapon is burned.

(2) Destruction By Demolition

(a) Using ½ pound of TNT or equivalent, prepare and place charges of explosives around the weapon(s).

(b) Determine whether electrical blasting caps and wire or nonelectric caps and safety fuzes are available for priming and detonating the charges. If nonelectric caps are used, they must be crimped to at least 2 meters of safety fuze.

(c) Connect charges with detonating cord as required to effect their simultaneous detonation. Dual-prime the charges to minimize the possibility of a misfire/hangfire.

(d) If charges are primed with nonelectric blasting caps, ignite the safety fuzes and take cover promptly. If the charges are primed with electric blasting caps, take cover before firing.

(3) Destruction By Gunfire.--Destruction by small arms fire cannot be relied upon to destroy the Redeye weapon and should be used only if no other method of destruction is available. The Redeye live rocket motors and HE warheads present an extremely hazardous

condition to personnel firing at the weapon from a distance of less than 50 meters.

(a) Physically smash the seeker.

(b) Stack or pile the Redeye weapons and related equipment.

(c) Fire on the equipment from distances of greater than 50 meters with rifles, machineguns, rifle grenades, or rocket launchers.

APPENDIX A

FAAD UNIT RESPONSIBILITIES CHART

SITUATION	CONTROL	REDEYE UNIT CMDRS ESTAB LIAISON WITH	PRIORITIES FOR AIR DEF	IS POSITIONED BY	DISPLACES	SECURITY	SUPPORT (MESS, MAINTENANCE, SUPPLY)
Static	Redeye unit Cmdrs through ATF/LF Air Control AAW System.	Supported unit	Supported unit	Redeye unit leader to best accomplish mission. Coordinated with supported unit.	With supported unit.	By supported unit but not to detract from mission of supported unit.	Normally, Redeye units must rely on support from supported units. Maintenance and resupply of Redeye weapons coordinated by Redeye unit Cmdr.
Fluid	Redeye unit Cmdr, through ATF/LF Air Control AAW System.	Units/Installations in which Redeye units are located.	As directed by Tactical Air Cmdr in coordination with overall AAW plan.	Redeye Commander	As directed by Redeye Commander.	No inherent requirement. Redeye unit Cmdrs coordinate with Cmdrs responsible for local area security.	Redeye unit Cmdr. Dispersion of Redeye teams may require support from unit in whose zone/position the Redeye teams are located.

APPENDIX B

TRAINING DEVICES

1. GENERAL

The successful engagement of aerial targets requires that the gunner be highly skilled in the handling and operation of the Redeye weapon. He must also make correct judgments that will result in missile launch at a time which will enable the missile to complete a successful intercept. The learning and retention of these skills require constant and continuing practice by every gunner. Maintaining gunner proficiency by the firing of actual weapon rounds is not feasible; however, the development of other training devices have met this requirement. These training devices provide a means of simulating all steps of the firing procedure except actual missile intercept of a target and include: the M76 training set, the Field Handling Trainer M46A2, the Redeye Launch Simulator (RELS), and the Moving Target Simulator.

2. TRAINING SET, GUIDED MISSILE SYSTEM, M76

a. The M76 training set (see fig. 49) consists of the M49E3 trainer, a battery charger, four batteries normally stored in the battery receptacles of the battery charger, and a shipping and storage container. The trainer requires one charged battery to conduct a mission.

b. The M49E3 trainer (see fig. 15) is made

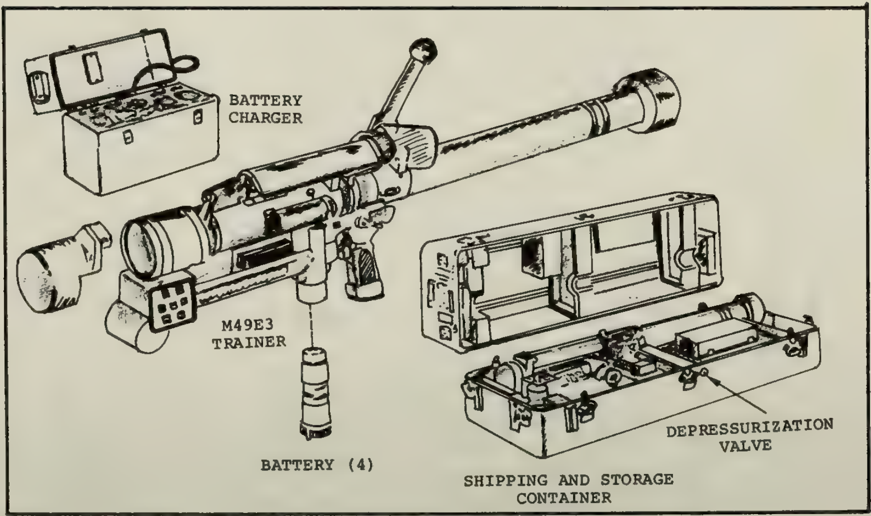


Figure 49.--M76 Training Set.

up of a launcher simulator and a missile simulator. The missile simulator is contained within the launch tube of the launcher simulator. The trainer is similar in appearance to the Redeye tactical weapon M41E2.

c. The four batteries are similar in shape to the BCU used with the tactical weapon, but are about 3 inches longer and weigh about 2 pounds more. A battery is capable of providing power for at least fifteen 31-second training missions without recharging. Each battery contains a plastic shield over the right contacts to protect the battery from accidentally discharging. The plastic shield is removed from the ring contacts only when the battery is in use during a training mission, or when being recharged in the battery charger. This shield remains in place over the rings when transporting or storing the batteries either in or out of the battery charger.

d. The battery charger (see fig. 50) is a compact, solid-state, trickle-type charger. All components are supported by the front panel of the metal housing container. Spare fuses and lamps are located in the container top under a cover plate attached by two thumbscrews. The battery charger is capable of charging one to four batteries at a time. Four independent receptacles receive the batteries, so charging of one is not affected by the others.

e. The shipping and storage container is an aluminum, two-piece shell with capacity for the M49E3 trainer and the battery charger with four batteries stored in the charger battery receptacles. A depressurization valve is provided

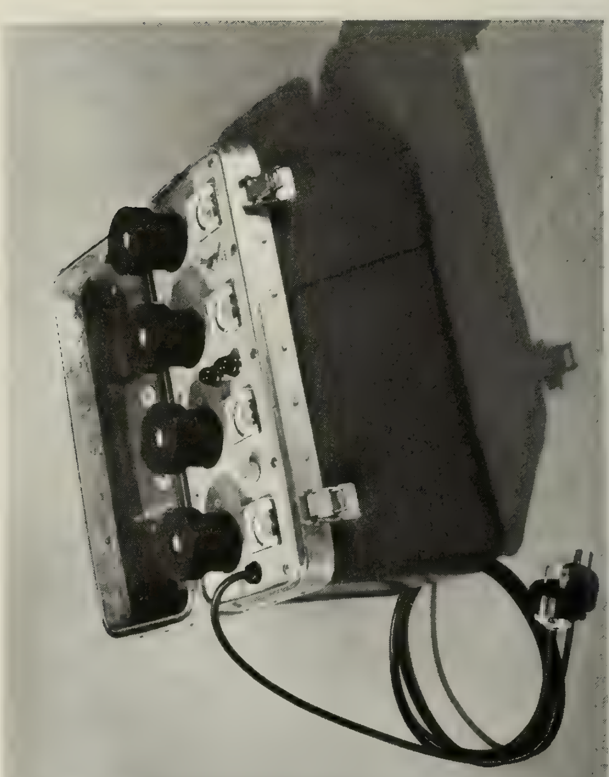


Figure 50.--Battery Charger.

to equalize internal pressure with the atmosphere before the container is opened.

f. The trainer has a closed-loop coolout system that recirculates freon to cool the seeker. A manually-operated pump is used to obtain the necessary pressures required for operation. Under normal conditions, at least nine training sequences can be accomplished when the cooling system is properly pressurized.

3. FIELD HANDLING TRAINER M47A2

The field handling trainer is a full scale weapon launcher ballasted to simulate the weight and balance of the tactical weapon. The field handling trainer is a rugged, inexpensive device designed to provide practice in the basic skills of Redeye weapon handling, operation, sighting, and ranging. Indications of target acquisition are not provided because the trainer does not have an infrared acquisition capability. Controls are identical to those of the tactical weapon and mechanical operation is the same. The trainer contains no active electrical components and is thus less costly and more durable than the tracking head trainer.

4. REDEYE LAUNCH SIMULATOR (RELS)

a. The RELS (see fig. 16) is comprised of standard Redeye components with the exception that the seeker is located external to the launcher tube. The weight is approximately 3 pounds heavier than the tactical weapon due to the addition of the seeker assembly. The indications received by the gunner during a training mission are in all respects the same as those of the tactical weapon up to and including launch. There is no sustainer motor included in the trainer; therefore, missile intercept does not occur. The RELS utilizes an eject motor to ballistically launch an inert missile to a maximum range of less than 350 feet. Safety considerations require a range area clear of obstructions and personnel extending a minimum of 350 feet forward and 42 feet rearward of the launch area.

b. The RELS can be reloaded in the field by Redeye gunners. The simulated missile is inserted in the aft end of the launch tube and held fast by the nylon locking screw. The electrical connection is made by inserting the connector of the simulated missile into the receptacle located on the aft end of the launch tube. (See TM 8394-14/1.)

c. Electrical power and coolant are provided by the use of an actual BCU in the same manner as with a tactical Redeye weapon. Once used, the BCU is discarded and another BCU must be used for each additional firing.

5. MOVING TARGET SIMULATOR (MTS) M87

The MTS (see fig. 17) presents the appearance of a flying aircraft against a natural background with realistic trichannel sound effects and infrared emissions from the targets. The MTS consists of the following major components: target projection console, firing platform, observer platform, IR mirror and pedestal, projection screen assembly, loudspeakers, trainer control console, 16mm motion picture films, and a background scenery lighting system.

APPENDIX C

UMPIRE CHECKLIST FOR FAAD UNIT OPERATION

1. COMMAND RELATIONSHIPS

a. Was the FAAD unit included in pertinent coordination briefings?

b. Was the operation plan available to the FAAD unit? When?

c. Was specific tactical mission assigned to FAAD unit in operation plan? Was it adequately defined?

d. When was FAAD unit assigned to supported unit?

e. Were FAAD teams in direct or general support or attached?

f. At what unit levels were FAAD teams deployed?

g. Were FAAD team assignments reviewed during exercise to achieve optimum utilization?

2. DEPLOYMENT OF FAAD TEAMS

a. Were the FAAD teams effectively deployed during the exercise?

b. Were the FAAD teams tactically deployed at all times during the exercise?

c. During their deployment, were the best elements of cover and concealment used to protect the FAAD team positions?

d. After a firing or series of firings, did individual FAAD teams move to alternate positions? If no, explain.

e. Were the FAAD teams deployed in the best possible positions to protect the vital or assigned areas?

3. COMMUNICATIONS--RADIO

a. What types of radios were employed?

Platoon	Section	Teams

b. What was the effectiveness of communications?

	Battery	Platoon	Section	Teams
Excellent				
Good				
Poor				

c. Was communication security adequate? If no, explain.

d. Were radio batteries available?

e. When were FAAD unit nets established?

FWC
FTC

4. TRANSPORTATION

a. What types of vehicles were employed?

Platoon	Section	Teams

b. Were vehicles adequate to support the exercise? If no, explain.

c. Was helicopter movement of FAAD units used?

d. Was fording gear employed?

5. LOGISTICS

a. Were the FAAD teams outfitted in accordance with TAM? If no, explain.

b. Were simulators available and used effectively?

c. Was resupply of rations, etc., accomplished by the supported unit?

d. Were facilities available for battery recharge?

6. TRAINING OBJECTIVES

a. Was level of FAAD unit training satisfactory? If no, explain.

b. Was formal training conducted during periods of inactivity?

c. Were simulator demonstrations conducted for benefit of other aviation units prior to exercise? What units?

7. AIRCRAFT IDENTIFICATION

a. List types of aircraft involved in exercise.

Friendly Aggressor

b. Tabulate exercise results.

Date A/C Type Passes Identified

Tracked Hit

c. List factors effecting identification (visibility, terrain, training, etc.).

8. MOTIVATION

a. Evaluate motivation of FAAD units at following levels:

Platoon Section Teams

b. Comment on methods of improving motivation.

9. CONCLUSIONS AND RECOMMENDATIONS

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AIR RECONNAISSANCE

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DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
WASHINGTON, D.C. 20380

13 September 1979

FOREWORD

1. PURPOSE

FMFM 5-6, Air Reconnaissance, sets forth doctrine, tactics, and techniques to be employed in operations and training involving air reconnaissance within the Fleet Marine Force.

2. SCOPE

This manual expands the doctrine and techniques for conducting and controlling tactical air multisensor reconnaissance, electronic reconnaissance, and visual observation contained in FMFM 5-1, Marine Aviation. Specific guidance is provided on request procedures for air reconnaissance. This manual also provides descriptions of reconnaissance aircraft, camera systems, and multisensor methods as well as examples of reconnaissance reports and documents.

3. CHANGES

Recommendations for improving this manual are invited from commands as well as directly from individuals. The attached User Suggestion Form should be utilized by individuals and forwarded to the Commanding General, Marine Corps Development and Education Command (Code D 036), Quantico, Virginia 22134.

4. CERTIFICATION

Reviewed and approved this date.

BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

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(Code D 036), Quantico, Virginia 22134

Subj: FMFM 5-6, Air Reconnaissance; recommendation concerning

1. In accordance with the Foreword to FMFM 5-6, which invites individuals to submit suggestions concerning this FMFM directly to the above addressee, the following unclassified recommendation is forwarded:

Page	Article/Paragraph No.	Line No.	Figure/Table No.

Nature of Change: ☐ Add ☐ Delete ☐ Change ☐ Correct

1. Proposed New Verbatim Text: (Verbatim, double spaced; continue on additional pages as necessary.)

2. Justification/Source: (Need not be double spaced.)

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AIR RECONNAISSANCE

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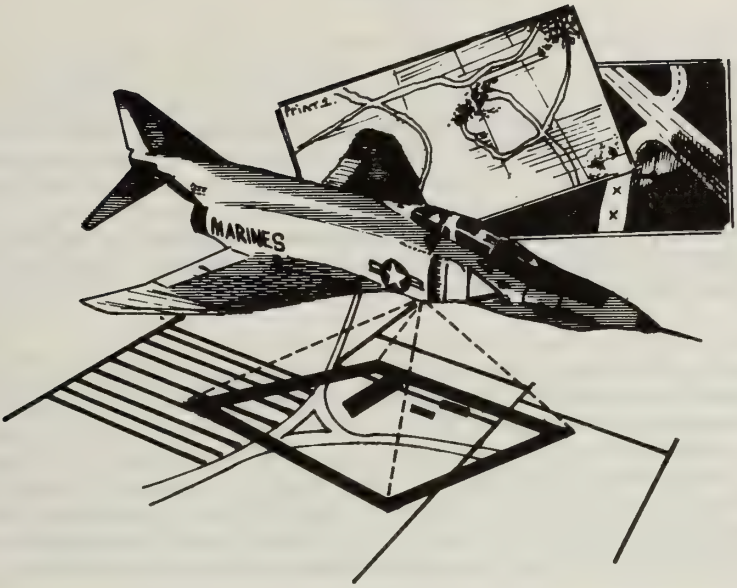


CHAPTER 1

FUNDAMENTALS OF AIR RECONNAISSANCE

Section I. INTRODUCTION

1101. GENERAL

a. The concept of acquiring vital information relative to the enemy situation through the extensive use of aerial reconnaissance and surveillance is an integral part of Marine Corps doctrine. Specifically, prior to D-day in an amphibious operation, a significant portion of the intelligence collection effort is accomplished by aerial reconnaissance and surveillance. After the assault is launched, other types of reconnaissance and surveillance assume roles of increasing importance. However, aerial reconnaissance and surveillance assets provide the commander landing force with the capability for sustained effective coverage of an objective area.

b. The conduct of air reconnaissance provides the tactical commander with a rapid means of acquiring current information on enemy activity, installations, and terrain. The tactics and techniques utilized by aircraft employed for air reconnaissance purposes must be flexible and versatile. Additionally, logistics support for these aviation assets is vital and the tactical commander must consider all available options compatible with the overall concept of operations.

c. This manual discusses the role of aerial reconnaissance and surveillance, to include tasks assigned, capabilities, limitations, support requirements, and tactical employment considerations. Operations are discussed as part of the Marine air-ground task force (MAGTF) with special attention being given to procedures for providing vital information and photo coverage to the ground commander in a timely manner. Command relationships, planning considerations, and execution for air reconnaissance operations are included in the text.

1102. HISTORICAL EVOLUTION

a. In June 1793, the French government added an "air arm" to its military forces by sending an aerial observer in a captive balloon to scout the movements of the enemy. On 2 June 1794, the commander of the French air arm made an ascent to observe enemy movements, permitting the French forces to win the battle for the area. Napoleon became an advocate of aerial reconnaissance and deployed balloons for aerial observation to Egypt in 1789, and to Italy in 1797.

b. The first time aerial reconnaissance was used for military purposes in the United States was during the Civil War. John Wise, a Pennsylvania balloonist, was ordered into Federal service on 1 July 1861. One new feature of his balloon was the inclusion of a thick sheet of iron on the bottom of the wicker basket to protect the observer from ground fire, the first known use of armor plate for aircraft. The most successful employment of aerial reconnaissance during the Civil War was accomplished by a balloonist named Thaddeus S. C. Lowe. He successfully introduced a number of innovations including aerial artillery fire adjustment and direct communications from air to ground.

c. The first naval aerial reconnaissance occurred in Russia some time prior to 1905 when Kovanko, the commander of a balloon crew, took aerial photographs of the Kronstadt and Petersburg fortresses. The Russians improved these techniques and successfully used aerial photo reconnaissance in the Russo-Japanese War of 1905.

d. In 1909, an aircraft developed by the Wright Brothers was accepted, and the "Heavier-Than-Air Division, United States Aerial Fleet" was born. By 1911, the Signal Corps had established a flying school at College Park, Maryland, including a course in aerial photography. The first photographs taken from a powered heavier-than-air aircraft were taken over San Diego, California, by Major H. A. Erickson. The pictures were excellent, and the uses of aerial photography were seen as advantageous.

e. World War I brought refinement to the aerial camera. Cameras became more and more sophisticated to the point where one camera weighed in excess of 600 pounds and had to be mounted in the aircraft. Tactics and platforms used for photography were strange in concept by today's standards; it was considered desirable to use slow stable aircraft for photo reconnaissance for the best quality pictures.

f. Between World War I and World War II came a number of new developments. Night photography, longer focal length lenses, and the start of infrared imagery were developed during this time. As World War II approached, the importance of aerial reconnaissance was realized further. The naval attache at the U.S. Embassy in London visited the British photo interpretation center at Wembley and was so impressed by the information about German activities and installations that he requested that American officers be sent to England to learn how it was done. Captain Charles Cox and Captain Gooderham McCormick, both Marines, joined the head of the Navy's Bureau of Aeronautics in the liaison visit. It led to the establishment of a school for photo interpreters (PI's) at Anacostia.

g. Despite the growth of the technology of reconnaissance, more words than pictures were being produced. The lack of an adequate stragetic aerial reconnaissance program in the Pacific during 1941 was at least as much to blame for the disaster at Pearl Harbor as any other factor.

h. As the war continued, aerial reconnaissance played a major part in locating the enemy. The concept of slow flying aircraft or refitted bombers being used as reconnaissance aircraft was finally discontinued, and it became recognized that reconnaissance aircraft had to be rated with the fastest fighters available to the enemy to reduce escort requirements and increase survivability.

i The Korean conflict again caught us unprepared. Between the years 1945 and 1950, severe "economy" measures had reduced available assets and reduced research and development programs. Research commenced as the war progressed.

j. The panoramic camera was first developed during this period. It produced a single photograph that produced lateral horizon-to-horizon coverage. Additionally, the stereo strip camera was developed and played a part in the amphibious assault at Inchon. Measurements of obstacles photographed by this camera proved to be within inches of those given by skilled interpreters. The 15-foot seawall at Inchon was easily surmounted by landing Marines because the tide was high enough to permit scaling, just as the photo interpreters had predicted. The ultimate result was a tremendous success.

k. The Vietnam War brought new developments. On 6 July 1968, the first aircraft developed for counterinsurgency (COIN) operations, the OV-10, was flown from Cubi Point, Republic of the Philippines, to Marble Mountain, Republic of Vietnam. Within 2 hours after landing, it was flying reconnaissance missions.

l. The Vietnam War also brought new obstacles to air reconnaissance with highly portable surface-to-air missiles. It is now possible for the enemy to have air superiority without launching their fighters. This development made necessary a radical reevaluation of the tactics and equipment necessary to conduct air reconnaissance. The types of devices and tactics to be used against these threats are still in the development stages today.

1103. FUNCTION OF AIR RECONNAISSANCE

a. Aerial reconnaissance and surveillance encompasses the use of aircraft to provide current information on enemy activity, installations, and terrain within the immediate area of operations. All operations are conducted with the ultimate goal of establishing a lodgment in the force beachhead area (FBHA).

b. Marine aviation air reconnaissance functions include the employment of multisensor, electronic, and visual reconnaissance/surveillance means to fulfill the specific and immediate requirements of the landing force. Specific functions are:

(1) Visual Reconnaissance.--A task normally performed by the pilot/air observer team. It provides information about the enemy, terrain, hydrography, and supplements operational information about friendly forces. Included is the direction of supporting arms to include control of close air support and adjustment of artillery or naval gunfire from the air. Normally, the mission is conducted from fixed-wing observation aircraft, however, jet aircraft or helicopters may be employed.

(2) Multisensor Imagery.--Provides a major means of developing information on the enemy to include natural conditions in the amphibious objective area (AOA). Most important is the fact that multisensor imagery can obtain information on otherwise inaccessible areas, either by the use of hand-held cameras from observation type aircraft or multisensor imagery jet aircraft equipped with photographic, side-looking airborne radar (SLAR), and infrared (IR) imagery means.

(3) Electronic Reconnaissance.--Provides information relative to the detection, identification, evaluation, and location of foreign, electromagnetic radiations emanating from other than nuclear detonations or radioactive sources, thereby providing a reasonably accurate estimate of the enemy's electronic order of battle (EOB).

1104. FUTURE CONSIDERATIONS

a. Aerial reconnaissance and surveillance operations are greatly threatened and restricted by sophisticated enemy air defense systems. The formidable threat must be counteracted by innovative tactics, techniques, and technological advances. The ability to conduct air reconnaissance missions in any future amphibious operation will depend upon the degree of air superiority achieved.

b. All future considerations for air reconnaissance and surveillance will continue to emphasize the capability of acquiring pertinent information relative to enemy dispositions and providing the tactical commander vital information and imagery on a timely basis. The threat over the modern battlefield may dictate the use of high performance aircraft for visual reconnaissance; this would require supplemental training for the Marine air observer (AO) and would to some extent degrade his capabilities to acquire pertinent information.

c. The use of remotely piloted vehicles (RPV's) is being considered for future reconnaissance systems due to the dense enemy air defense environment. These RPV systems could be used until air superiority is gained, thereafter permitting use of manned systems.

d. Additionally, with the advent of the highly sophisticated Marine air-ground intelligence system (MAGIS), it is envisioned that intelligence will be disseminated to the tactical commander in a more timely manner than at present.

e. Air reconnaissance is vital to the landing force in any amphibious operation. Innovative, realistic training for the naval aviators, naval flight officers (NFO's), Marine air observers, and other crewmembers is a prerequisite for survivability on the battlefield.

Section II. TERMINOLOGY

1201. GENERAL

The standardization of military terminology has become increasingly significant as a major step toward effective communications and common understanding within the Department of Defense (DOD), between DOD and other Federal departments and agencies, between the United States and its allies, and within the civilian-military community. Better communications and understanding are achieved by the consistent use of an agreed definition for a given term and by avoiding the use of different terms when the same meaning is intended.

1202. REFERENCES

Criteria for acceptability of terms and definitions used in this manual are as follows:

a. JCS Pub 1, Department of Defense Dictionary of Military and Associated Terms.--Terms and definitions published in JCS Pub 1 have a specific military or associated significance to joint service or DOD interest and usage and are subject to misunderstanding or misuse. New terms or changes to existing terms and/or definitions are encouraged; however, until such change is published, terms defined therein and designated "DOD" will not be defined otherwise or altered in any way.

b. NWP 3, Naval Terminology.--This Naval Warfare Publication is a supplement to JCS Pub 1 and contains definitions of naval terminology and abbreviations exclusive of those in JCS Pub 1. The definitions and abbreviations are those in general use in the U.S. Navy and are drawn from authoritative Allied and national naval publications.

c. LFM 01/NWP 22, Doctrine for Amphibious Operations.--This Naval Warfare Publication expands JCS Pub 1 terms and definitions only when further explanation is required for clarity in conjunction with amphibious operations. In addition, terms peculiar to amphibious operations are defined in the glossary and throughout the text. LFM 01 provides the agreed joint amphibious doctrine, procedures, and amphibious terms for the Army, Navy, Air Force, and Marine Corps.

d. LFM 04/NWP 17, Doctrine and Procedures for Airspace Control in the Combat Zone (U).--This Naval Warfare Publication is comprehensive in scope and designed to provide guidance to U.S. forces using airspace over the combat zone, with the notable exception of amphibious operations already addressed by LFM 01/NWP 22.

1203. DEFINITIONS

The primary source for terms and definitions for this manual has been JCS Pub 1. Whenever possible throughout this manual, those words and terms for which there is an established JCS Pub 1 definition have been identified by unreferenced quotation marks. Many words, terms, and abbreviations having doctrinal significance have been given more than one definition. The definition used in this manual is that provided in the following and with this precedence:

a. First: JCS Pub 1, Department of Defense Dictionary of Military and Associated Terms.

b. Second: SM-59-72, Joint Operations Planning System, Volume I.

c. Third: NWP 3, Naval Terminology.

d. Fourth: LFM 01, Doctrine for Amphibious Operations.

e. Fifth: LFM 04/NWP 17, Doctrine and Procedures for Airspace Control in the Combat Zone (U).

f. Sixth: Naval Warfare Publications (NWP's).

g. Seventh: Naval Warfare Information Publications (NWIP's).

CHAPTER 2

ORGANIZATION AND MISSIONS

Section I. INTRODUCTION

2101. GENERAL

This section deals with the primary air reconnaissance means found in the Marine aircraft wing (MAW). Specific organizations and missions of all Marine aviation units are found in FMFM 5-1, Marine Aviation.

2102. MARINE AIRCRAFT WING

The elements within the aircraft wing tasked with the air reconnaissance role are the Marine tactical reconnaissance (VMFP), Marine tactical electronic warfare (VMAQ), Marine observation (VMO), Marine light helicopter (HML), and Marine attack helicopter (HMA) squadrons. Other squadrons are capable of performing selected tasks in the air reconnaissance role, however, they will not be discussed as separate entities in this chapter.

2103. MARINE AVIATION SQUADRONS

The various types of squadrons associated with the air reconnaissance role are listed below:

a. Marine Tactical Reconnaissance Squadron.--The Marine tactical reconnaissance squadron is organized to provide multisensor imagery reconnaissance to Marine forces. It is structured to operate as a subordinate unit of the Marine aircraft group (MAG) and, when appropriately augmented, is capable of functioning independently. Normally, mission support will be provided by detachments operating either independently or as part of task organized units.

(1) Mission.--The mission of the VMFP is to conduct aerial multisensor imagery reconnaissance, to include aerial photographic, infrared and side-looking airborne radar (SLAR) reconnaissance in support of Fleet Marine Force operations.

(2) Tasks

(a) Conduct day and night multisensor imagery reconnaissance.

(b) Conduct aerial prestrike and poststrike multisensor imagery reconnaissance for targeting and damage assessment.

(c) Maintain the capability of operating from aircraft carriers, advanced bases, and expeditionary airfields within the capability of assigned aircraft.

(d) Maintain the capability to operate during darkness and under instrument flight conditions.

(e) Provide for the production or reproduction of aerial multisensor imagery obtained by organic aircraft within the capability of assigned laboratory equipment.

(f) Maintain the capability of deployment or extended operations employing aerial refueling.

(g) Be prepared to deploy detachments aboard aircraft carriers to advanced bases or expeditionary airfields (EAF's).

(h) Process and provide aerial imagery to wing and/or commander landing force.

(i) Provide liaison personnel to wing and landing force staff officers to assist in VMFP employment planning.

(j) Perform organizational maintenance on assigned aircraft.

b. Marine Tactical Electronic Warfare Squadron.--The Marine tactical electronic warfare squadron is organized to provide tactical airborne electronic reconnaissance and airborne electronic warfare in support of Marine forces. It is structured to operate as a subordinate unit of a MAG, under the operational control of the MAW, and when appropriately augmented, is capable of functioning independently. Normally, mission support will be provided by detachments operating either independently or as parts of task organized units.

(1) Mission.--The mission of the VMAQ squadron or detachment is to conduct airborne electronic warfare in support of Fleet Marine Force operations. This includes airborne electronic support measures (ESM) and airborne electronic countermeasures (ECM).

(2) Tasks

(a) Conduct airborne tactical electronic reconnaissance operations.

(b) Conduct airborne ESM and airborne ECM operations.

(c) Process and provide tape recordings and reports of intelligence obtained from tasks listed in subparagraphs (a) and (b).

(d) Process and provide complete up-to-date electronic order of battle information from recorded tapes.

(e) Conduct airborne electronic and communication countermeasures operations to include ECM operations for electronic counter-countermeasures (ECCM) training of FMF units.

(f) Maintain the capability of operating from aircraft carriers, advanced bases, and expeditionary airfields within the capability of assigned aircraft.

(g) Maintain the capability to operate during hours of darkness and under instrument flight conditions.

(h) Maintain the capability of deployment or extended operations employing aerial refueling.

(i) Be prepared to deploy detachments aboard carriers to advanced bases and expeditionary airfields.

(j) Process and provide electronic intelligence reports as directed in accordance with assigned tasking.

(k) Provide liaison personnel to wing and landing force staff officers to assist in VMAQ employment planning.

(l) Perform organizational maintenance on assigned aircraft.

c. Marine Observation Squadron.--The VMO is a fixed-wing aircraft squadron attached to the helicopter MAG. The visual observation mission performed by the squadron dictates a need for proximity to the ground force command post, which facilitates the necessary exchange of information. Thus, collocation with the helicopter organizations located nearest the ground combat element command post is ideal. All utility and liaison missions are secondary to the aerial reconnaissance and observation roles of the VMO.

(1) Mission.--The mission of the VMO is to conduct aerial reconnaissance, observation, and forward air control operations to support the landing force in the ship-to-shore movement and in subsequent operations ashore.

(2) Tasks

(a) Conduct aerial reconnaissance and observation in support of FMF operations.

(b) Conduct forward air control, artillery and naval gunfire spotting, and observation missions.

(c) Conduct emergency aerial supply and resupply within the capability of assigned aircraft.

(d) Augment local search and rescue facilities.

(e) Conduct frontline, low-level aerial photography.

(f) Conduct such other operations as may be required within the capabilities of assigned aircraft.

(g) Maintain the capability to operate under conditions of reduced visibility and darkness.

(h) Perform organizational level maintenance on assigned aircraft and associated equipment.

(i) Provide second echelon maintenance for organic motor transport equipment.

d. Marine Attack Helicopter Squadron.--The HMA is an attack helicopter organization. It is equipped with AH-1 helicopters dedicated to providing close-in fire support while escorting helicopters or surface motor marches. Additional tasks may include visual reconnaissance, air control, and air spot assignments during the initial stages of the amphibious assault.

(1) Mission.--The mission of the HMA is to provide close-in fire support and fire support coordination in aerial and ground escort operations during the ship-to-shore movement and within an objective area.

(2) Tasks

(a) Conduct armed escort flights in support of personnel and cargo carrying helicopters.

(b) Provide landing zone suppression fire support.

(c) Conduct visual and visual armed reconnaissance.

(d) Provide target marking and airborne direction for the attack of surface targets by high performance aircraft.

(e) Escort and provide suppressive fires for surface convoys and other ground unit operations.

(f) Maintain the capability to operate from aircraft carriers or other floating bases.

(g) Conduct point target attacks of threatening armor.

(h) Provide air coordination for the utilization of supporting arms.

(i) Maintain the capability to operate under conditions of darkness and reduced visibility.

(j) Perform organizational maintenance on assigned aircraft.

(k) Provide second echelon maintenance for organic motor transport equipment.

e. Marine Light Helicopter Squadron.--The HML is a utility helicopter support organization. It is equipped with UH-1 helicopters and is dedicated to utility support for the landing force. Additional tasks may include visual reconnaissance, air control, and air spot assignments during the initial stages of the amphibious assault.

(1) Mission.--The mission of the HML is to provide utility combat helicopter support to the landing force in the ship-to-shore movement and in subsequent operations ashore.

(2) Tasks

(a) Conduct emergency aerial supply and resupply.

(b) Conduct frontline casualty evacuation.

(c) Provide airborne control of tactical air support operations as required for command and control.

(d) Conduct liaison and courier service.

(e) Augment local search and rescue facilities within the capabilities of assigned aircraft.

(f) Conduct special operations as directed by higher authority.

(g) Perform organizational maintenance on assigned aircraft.

(h) Provide second echelon maintenance for organic motor transport equipment.

f. Composite Squadron.--Currently, there is but one permanently formed composite squadron in the Marine Corps. That organization, HMX-1, is not a fleet organization. It is included here to explain the nature of a composite squadron.

(1) A composite squadron has as its derivation a published table of organization (T/O). This table of organization is oriented toward the mission of the squadron and the aircraft assigned to or operated by that squadron. In all cases, the assignment aircraft are dissimilar in type and/ or class.

(2) The composite squadron found in the MAGTF is a task organized entity. All attachments and detachments are temporary in nature and do not appear in the T/O. Within the aviation community, the minus, reinforced concept may be applied to squadron level units (aviation groups and wings are task assigned). The HMM minus a portion of its CH-46's and reinforced with CH-53's, UH-1's, AH-1's, OV-10's, and AV-8's (as appropriate) is a unique unit within the Fleet Marine Forces.

Section II. MARINE AIR COMMAND AND CONTROL SYSTEMS (MACCS)

2201. GENERAL

The control of aircraft extends with great detail over a much larger area than other types of military control. Time and space factors preclude a commander from subdividing an extensive area into small zones of action and exercising control of air operations through a number of subordinate commanders as in the case of ground operations. Because of these factors and because of the requirement for immediate in-flight response to directives and orders in air operations, it is necessary for the controlling commander to deal directly with individual aircraft flights through a centralized control system. For example, a situation may develop which would require that aircraft airborne on a prebriefed visual reconnaissance mission be diverted to conduct a forward air control mission. Time would not permit the changes in orders to be transmitted through a group commander, even though the aircraft are organic to the group. It is in this sense that coordination and control of air operations over a relatively broad area by a single commander is emphasized. All aircraft operating in the objective area, however, are not controlled from a single location. The air control system does have subagencies, all of which exercise this detailed control of aircraft to assist them in accomplishing their missions.

2202. CONTROL OF AIR RECONNAISSANCE AIRCRAFT

a. Control.--This aspect of Marine aviation is crucial, since it integrates all aircraft activity into a single, coordinated system. It provides for the exercise of authority over, and direction of, air support elements during the conduct of operations. Through the Marine air command and control system, control is exercised to perform the following for all other aviation functions:

(1) Air space and air traffic control.

(2) Employment of aviation assets and weapons systems.

(3) Selection, coordination, and integration of the agencies of the MACCS for the execution of all Marine aviation functions.

b. Control of Air Reconnaissance.--FMFM 5-1, Marine Aviation, presents a thorough discussion of the meaning of control as it affects all operations; however, control of air reconnaissance is restated here. As previously described, the major categories of air reconnaissance are visual reconnaissance, multisensor imagery, and electronic. Rather than treat each category separately, control will be discussed according to the two major types of control which allow the easiest classification--air direction and air control.

(1) Air Direction.--Air reconnaissance operations are characterized by low flight altitudes, extended movement within ground unit airspace, and longer mission execution times. Therefore, positive radar control is not normally exercised. This is because either altitudes are too low, or areas are too close to long-range surveillance radars to allow discrimination among radar contacts. It also may be because control is more appropriate on-scene, or because positive control is unnecessary, given existing

air defense conditions. Particularly with forward air control missions, the major agencies of the MACCS are more concerned with timely allocation of resources to existing mission requirements, than with the actual conduct of the mission. Terminal control agencies govern mission conduct. In close air support operations, the mission is normally controlled by on-scene terminal controller such as the airborne forward air controller (AFAC), in direct contact with the supported unit. Major agencies such as the tactical air command center (TACC) and direct air support center (DASC) focus attention on unforseen requirements to supply additional aircraft resources. Air direction may be accomplished simply through ensuring timely launch of preplanned missions. In most instances, however, an intense effort is required to divert resources, make secondary mission assignments, and draw upon on-call resources to satisfy requirements which differ from the schedule. In these instances, air direction includes assessment of the priority of other missions, aircraft configurations, en route flight clearances, and substitute action for requesters from whom support is being withdrawn. Thus, air direction is exercised in most visual reconnaissance and airborne forward air control operations.

(2) Air Control.--The other aspect in the function of control of aircraft in air reconnaissance involves those operations wherein actual air control is exercised in the mission. These operations are characterized by conduct at sufficient altitude and distance from controlling agencies to allow radar acquisition and/or the use of terminal control agencies. This need not always entail surveillance radar control, but radar monitoring is preferred for fixed-wing air reconnaissance operations. Fixed-wing multisensor imagery and electronic surveillance flights departing the objective area are examples of these types of operations in air reconnaissance. Air direction is exercised by a principal agency, while actual air control is exercised by MACCS radar facilities, or other en route, air traffic control agencies. Radar controlled multisensor imagery utilizing air support radar teams (ASRT's) or inflight refueling rendezvous are other examples of more precise air control in air reconnaissance. Terminal control is exercised in almost all instances of air reconnaissance.

2203. CONTROL AGENCIES

The following control agencies perform the described tasks for air reconnaissance:

a. Tactical Air Command Center.--The TACC is the senior MACCS agency. Within it, the supervision, coordination, and general control of all tactical air operations in the MAGTF area of responsibility are conducted. It also provides the Marine tactical air commander (TAC) the facilities and means to direct and coordinate organic aviation with that of other services. The TACC exercises its command and control of the entire MACCS through agencies, both organic and nonorganic to the Marine air control group (MACG). These agencies include the DASC and ASRT's of a Marine air support squadron (MASS), one or more tactical air operations centers (TAOC's) from the Marine air control squadrons (MACS's), and the tactical air control parties (TACP's) of the Marine division. To effectively fulfill its responsibility for air direction and command of air reconnaissance operations, current intelligence information regarding pertinent aspects of the air and ground situation is collected by the TACC. General situation information is maintained by displays to enable the TAC or his designated representative to rapidly analyze and manage aviation assets. Control of air reconnaissance is exercised through the DASC, terminal controllers, and in some instances, the TAOC. The TACC retains scramble authority for the commitment of reserve aircraft to various air contingencies, whether direct or indirect air support. The TACC is equipped with the communication links necessary for rapid shifts of aviation assets as the air situation requires. This paragraph describes the role and tasks of the TACC in air reconnaissance as well as its subordinate role when it is designated a tactical air direction center.

(1) Role.--The role of the TACC is to function as the senior MAGTF air command and control agency and to establish the operational command post of the MACCS from which the TAC can supervise and coordinate all MAGTF tactical air operations.

(2) TACC Tasks and Duties.--In the execution of responsibilities, the TACC performs certain air reconnaissance tasks and duties:

(a) Tasks.--In carrying out the air reconnaissance plans of the tactical air commander, the TACC is responsible for the following:

1 To maintain complete information on the air situation, including that ground combat information essential to the air effort.

2 To manage all aircraft in the objective area to ensure the most balanced and properly weighted utilization of assets for tactical air operations.

3 To oversee the operations of subordinate MACCS agencies to preserve economy and unity of effort in the execution of the TAC's air plans.

4 To prescribe emission control (EMCON) conditions in the objective area.

5 To prescribe succession of command and control responsibilities within the MACCS to compensate for any serious degradation within a component agency.

(b) Duties.--In performing the preceding air reconnaissance tasks, some of the duties of the TACC are as follows:

1 Coordinating the utilization of aircraft by the DASC.

2 Diverting aircraft from scheduled missions to meet other priorities.

3 Briefing pilots of diverted aircraft, as required.

4 Establishing alert conditions for ground alert aircraft.

5 Providing subordinate control agencies with appropriate flight schedules, identification signals, aircraft call signs, alert conditions, and aircraft availability.

6 Maintaining current status displays of all friendly air operations and detected threats.

7 Providing the focal point for the dissemination of tactical data information between air control agencies, both internal and external to the MACCS.

b. Tactical Air Direction Center (TADC).--The TADC is an air operations facility subordinate to a TACC (USN/USAF/USMC). The TADC acts to coordinate and direct all air operations in a specified portion of the objective area. The TADC is normally identical in organization, facilities, and capabilities to a TACC. A TAOC can also function as a TADC for limited periods of time. The essential difference between the TACC and the TADC is the amount of airspace for which each is responsible and the scope of their assigned tasks. When the MAGTF has overall responsibility for control of air in the objective area, the MAGTF commander establishes a TACC. If, however, overall responsibility rests external to the MAGTF, the commander establishes a TADC for his sector of responsibility. When it becomes necessary to organize an amphibious task force into subordinate task groups, each task group may employ a TADC (afloat) for control of air operations in its sector of responsibility. Overall control is retained by the commander amphibious task force (CATF) through the task force TACC. The MACCS TADC may be viewed as a similar "task group" agency ashore with responsibility for air operations in the landward sector. When the commander landing force (CLF) is capable of assuming control and, when approved by the CATF, all control of assault support operations (in the objective area) passes ashore. The primary control agency, previously designated a TADC, becomes the TACC. The CATF's TACC reverts to the status of a TADC (afloat).

c. Tactical Air Operations Center.--The TAOC is the subordinate operational element of the Marine air command and control system designed for control of en route air traffic and air defense operations. The TAOC is placed under the control of a TACC/TADC ashore or afloat, depending upon the specific phase of a particular operation. Because of its surveillance radar capabilities, it is the primary source of radar control for all aircraft in its sector of responsibility. The TAOC detects, acquires, and tracks targets in its assigned area of responsibility and provides an up-to-date display of the air situation. Tactical data is exchanged by means of digital and/or voice communications with friendly aircraft, adjacent TAOC's, the TACC/TADC, and other agencies.

(1) Role.--The role of the TAOC in air reconnaissance operations is to provide navigational assistance to friendly aircraft in the accomplishment of support missions. Additionally, the TAOC functions as the alternate TACC/TADC, when directed.

(2) Tasks

(a) To recommend geographic sectors/subsectors of responsibility for itself and component elements.

(b) To detect, identify, and classify all aircraft within its sector of responsibility.

(c) To maintain a summary display of the air situation within its capabilities and to disseminate appropriate elements of this information to other designated agencies.

(d) To coordinate and execute emission control conditions set by higher headquarters.

(e) To operate as a TACC/TADC for limited periods.

d. Direct Air Support Center.--The DASC is the principal air control agency responsible for the conduct of tactical operations directly supporting ground forces. It functions in a decentralized mode of operations, but is directly supervised by the TACC/TADC. It is normally the first major air control agency ashore and normally lands with the senior ground combat element fire support coordination center (FSCC); e.g., scheduled or on-call waves. The DASC coordinates close air support strikes, assault support, and certain air reconnaissance missions. It coordinates the timely distribution of air assets assigned by the TACC (afloat) and helicopter direction center (HDC) for allocation to appropriate terminal control agencies. These terminal control agencies include the forward air controller, the airborne forward air controller, the tactical air coordinator (airborne) (TAC(A)), the helicopter coordinator (airborne) (HC(A)), and the air support radar teams. The DASC collocates with the senior ground combat element FSCC and works closely with this agency to ensure the coordination with other supporting arms. Because of the necessity for detailed and continuous communications and coordination between the DASC and the FSCC, both agencies, where possible, should be collocated in the same operating facility. When displacing either ashore or elsewhere, key DASC personnel should accompany personnel of the ground combat element to advise and assist in site selection. The DASC, equipped and operated by the MASS, may displace by echelon to preserve operational continuity. In addition to controlling and coordinating direct air support aircraft employment, the DASC receives ground and air intelligence information and disseminates this information to the TACC/TADC, TAOC, and FSCC. The DASC also coordinates the movement and identification of friendly aircraft and responds to the TAOC's requirement for aircraft position information for aircraft under its control.

(1) Role.--The role of the DASC is to provide the means for processing direct air support requests, to coordinate aircraft employment with other supporting arms, and to control assigned aircraft with the procedures of area air space control. FMFM 5-1, Marine Aviation, contains a complete discussion of the DASC configuration and the circumstances appropriate for their employment.

(2) Tasks

(a) Receives fragmentary operation orders (FRAG's) and coordinates scheduled preplanned air reconnaissance.

(b) Receives, processes, and coordinates ground force requests for immediate or on-call air reconnaissance.

(c) Adjusts preplanned schedules and diverts airborne assets in accordance with the priorities of the continuing ground combat situation and degree of decentralized authority assigned by the TACC/TADC.

(d) Coordinates the execution of air reconnaissance missions with the activity of other fire support means through the appropriate FSCC to ensure maximum aircraft safety and minimum mutual interference.

(e) Refers all conflicts in supporting arms activity to the appropriate FSCC for resolution consistent with the mission of supported units.

(f) Provides an operational point of contact for both user agencies and air reconnaissance aircraft for the resolution of conflicting priorities and the coordination of efforts.

(g) Serves as the ground combat element's operational point of contact to ensure air reconnaissance response to changing ground tactical situations and a possible reevaluation of priorities.

(h) Receives and disseminates to the ground element's air representative all pertinent tactical intelligence and information reported by aircraft performing air reconnaissance missions.

(i) Assigns control of DASC aircraft to subordinate terminal control agencies such as TACP's, TAC(A)'s, FAC's, AFAC's, ASRT's, and landing zone control parties (LZCP's).

(j) Provides requesting aircraft and other air control agencies with appropriate advisory information for the conduct of safe flight. Such information includes airstrikes, TPQ drops, enemy antiaircraft activity, and airspace coordination areas (ACA's).

(k) Assigns general routes of aircraft approach and retirement.

(l) Records, monitors, and displays information on the planned and existing state of air reconnaissance missions and advises TACC, TADC, and FSCC as required.

e. Air Support Radar Team.--The ASRT is the terminal air support control agency subordinate to the DASC which provides precision radar tracking and positioning of aircraft in all weather conditions. The ASRT employs a radar course directing central (RCDC), which consists of a precision radar and associated computer equipment designed to accurately position aircraft without visual reference to the earth's surface. Aircraft are guided to a point in space from which supplies or ordnance are released and night multisensor imagery can be obtained. This is accomplished by using radar derived positional information and manually inserted target position information, wind data, ballistics data based upon the type and altitude of the aircraft. In order to accurately compute this radar positional information, the RCDC must be established by an accurate land survey. There are three ASRT's organic to the MASS of the MACG. They are organized as highly mobile air control facilities and operate in support of the MAGTF.

(1) Role.--The role of the ASRT is to provide day/night all-weather precision control of aircraft operating in support of MAGTF operations.

(2) Tasks.--The principal task of the ASRT in air reconnaissance is to provide precision control of aircraft for medium and low altitude level night multisensor imagery in support of the MAGTF. The ASRT performs the following:

(a) Receives and computes target data for air delivery missions.

(b) Briefs aircrews on the mission requirements.

(c) Coordinates with the TAOC or other appropriate control agencies to receive radar handovers of mission aircraft.

(d) Keeps the DASC fully advised as to ASRT operational status and conduct of operations.

(e) Notifies the DASC of the results of each mission.

(f) Positions aircraft at a geographic position which assists or permits the aircraft to accomplish a designated mission. Examples are:

_1_ Positioning aircraft for paradrops.

_2_ Positioning aircraft for flare drops.

_3_ Positioning helicopters over landing zones.

_4_ Positioning aircraft for night photo missions.

f. _Tactical Air Control Party_.--The TACP is "a subordinate operational component of a tactical air control system designed to provide air liaison to land forces and for the control of aircraft." TACP's establish and maintain facilities for liaison and communications between supported units and appropriate control agencies, inform and advise the ground unit commander on the employment of supporting aircraft, and request and control air support missions. There are two types of tactical air control parties. The first type is organic to the infantry battalion and the second type is organic to the infantry regiments and division. The principal difference between the two types of TACP's is that the battalion TACP has two forward air control parties (FAC parties), while the regimental and division TACP's have none.

(1) _Tasks_

(a) Provide liaison and communications between the commander of the ground unit to which assigned and the appropriate air control agency.

(b) Provide the commander of the ground unit current information on the employment and availability of air reconnaissance aircraft assigned to the support of his unit.

(c) Advise the ground unit commander and staff on matters concerning air reconnaissance.

(d) Prepare and forward requests for air reconnaissance in accordance with instructions received from the unit to which attached.

(e) Relay pertinent information to the tactical air control agency.

(f) Exercise control of aircraft during the terminal phase of air reconnaissance missions.

(2) _Division TACP_.--The division TACP consists of 2 air control officers and 11 enlisted communication personnel. The senior air control officer normally performs the duties of the commander of the air and naval

gunfire platoon, communication company, of the headquarters battalion. The air control officers assist the division air officer by monitoring all immediate air reconnaissance requests from subordinate units, supervising the operation of aviation nets in the FSCC, and keeping the fire support coordinator (FSC) advised of the general air situation and specific requests of subordinate units.

(3) Regimental TACP.--The regimental TACP is composed of one officer called the regimental air officer assigned to the regimental operations section, and four enlisted communication personnel from the communication platoon of headquarters company. The air officer acts in a dual capacity as a special staff officer to the regimental commander in regard to all aviation matters and as the officer-in-charge of the regimental TACP. In the latter capacity, he may act as an air controller actually controlling an air reconnaissance mission. He coordinates and consolidates all preplanned air support requests from subordinate units with the regimental FSC. He coordinates, as necessary, immediate air reconnaissance requests from subordinate TACP's.

(4) Battalion TACP.--The battalion TACP's are composed of 3 officers and 12 enlisted communication personnel. The senior naval aviator/naval flight officer functions as the battalion air officer and each of the other two officers is the leader of a FAC party.

(a) Air Officer.--The battalion air officer's duties are similar to those of the regimental air officer. He normally remains with the battalion command group when deployed and functions as chief advisor to the battalion commander on all air operation matters. The battalion air officer supervises the training and operation of the two battalion FAC parties.

(b) Forward Air Control Party.--The two FAC parties generally accompany frontline companies of the battalion during all phases of the amphibious operation. The forward air controller may control aircraft executing air reconnaissance missions in support of the battalion. The FAC maintains positive ground-air radio communications with assigned support aircraft from a forward position which permits him to observe and direct each aircraft. The primary assault support duties of the FAC party are:

1 To operate well forward with the assault units of the battalion.

2 To advise the supported company commander on the proper employment of air.

3 To gather and report all information of an intelligence nature.

4 To stay abreast of the supported unit's plans, position, and needs.

5 To stay abreast of the enemy situation and location of friendly units.

(5) Division Air Section.--The division air section consists of four naval aviators/naval flight officers and is headed by a colonel. Although listed here, it is not a part of the division TACP. (Personnel from

the division air section may augment the division TACP in the FSCC as necessary and the division air officer has staff cognizance over TACP operations.) The division air officer does, however, perform the following tasks normally performed by the TACP's:

(a) Provide the division commander current information on the employment and availability of aircraft assigned to the support of the division.

(b) Advise the division commander, his staff, and commanders of those elements not having TACP's, on matters concerning air support.

(c) Prepare and forward requests for preplanned air reconnaissance in accordance with instructions received from the division commander.

(d) Monitoring and exercising overall control of TACP operations and procedures to ensure standardization of training and the highest degree of combat readiness.

Section III. EQUIPMENT AND SYSTEMS

2301. GENERAL

In air reconnaissance, as in all other military elements during the amphibious assault, the capabilities and limitations of the equipment and systems influence the tactical decisions. This section describes aircraft, weapons, ground support equipment and systems, and automated data systems as they apply to air reconnaissance. Some of the equipments and systems will play a role in functional areas other than air reconnaissance. Such application will not be discussed in this text; therefore, reference to the appropriate FMFM 5-series manual is required for information regarding application to other functional areas.

2302. AIR RECONNAISSANCE AIRCRAFT

Air reconnaissance aircraft are specifically designed or modified to meet the varied roles of air reconnaissance. The aircraft incorporate various combinations of air reconnaissance, such as visual reconnaissance, multisensor imagery, and electronic surveillance. The commander must be familiar with the characteristics and capabilities of the aircraft in order to properly plan for air reconnaissance in the overall air support requirements.

a UH-1.--The UH-1 is a turbine powered, single main rotor, utility helicopter. It is compatible with all amphibious assault ships. Skids provide landing mounts instead of wheels; however, ground handling wheels are provided for towing and shipboard handling. Personnel enter the aircraft through the hatch on either side of the aircraft. Cargo is loaded through the personnel hatches or carried externally. Normal cruising speed for the UH-1 is 105 knots. Communications capabilities include two-way UHF, FM, and HF radio. In addition, a communication package, the command and control kit, can be installed for the use of the ground unit commander. The UH-1 may be flown with a single pilot and a qualified observer for certain specific missions. Because of its low silhouette and its ability to land in small, unprepared zones, the UH-1 is more suited for medical evacuation and emergency resupply in forward areas than are other types of helicopters. (See fig. 1.)

b. AH-1.--The AH-1 is a light attack helicopter which was developed to provide close-in fire suppression for ground troops and transport helicopter escort missions. Its airframe, rotor, and avionics systems were designed to give the aircraft a slender head on silhouette and accommodate the carrying of ordnance. The most recent revsion of the AH-1 series is configured to carry the tube launched, optically tracked, wire command link, guided missile system (TOW) antitank missile. The AH-1 may be, but is not normally, flown with a single pilot and a qualified observer.

c. OV-10.--The OV-10 is a twin turboprop, multipurpose, fixed-wing, short takeoff and landing (STOL) aircraft. Two canted sponsons are mounted on the lower fuselage providing four external store stations housing four 7.62mm guns with integral ammunition supply and an additional store capacity of 600 pounds on each station. Additional weapons or a single external fuel tank may be installed on a centerline store station, 1,200 pounds maximum limit, under the fuselage. The maximum fuselage store loading, total all

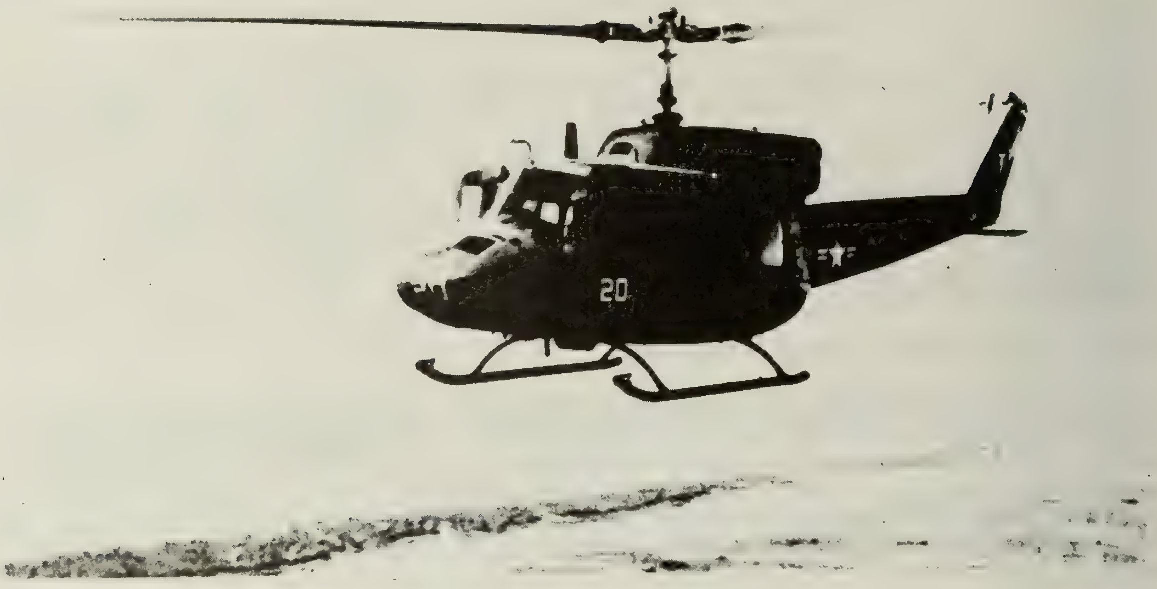


Figure 1.--UH-1.

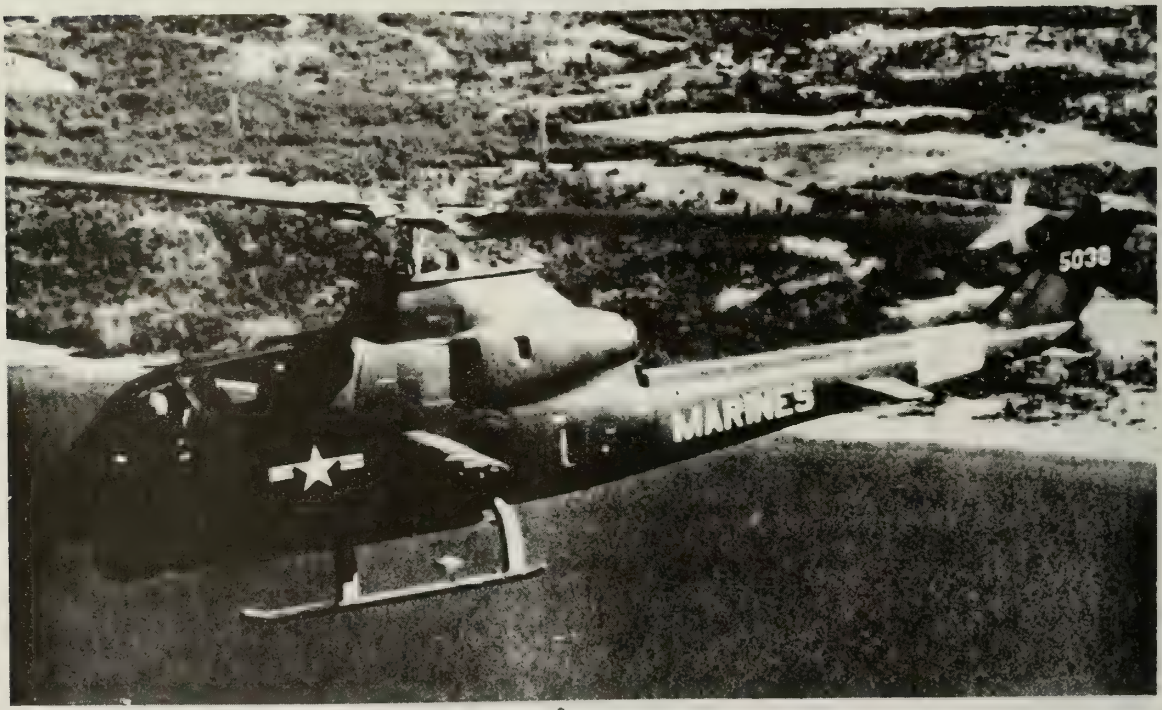


Figure 2.--AH-1.

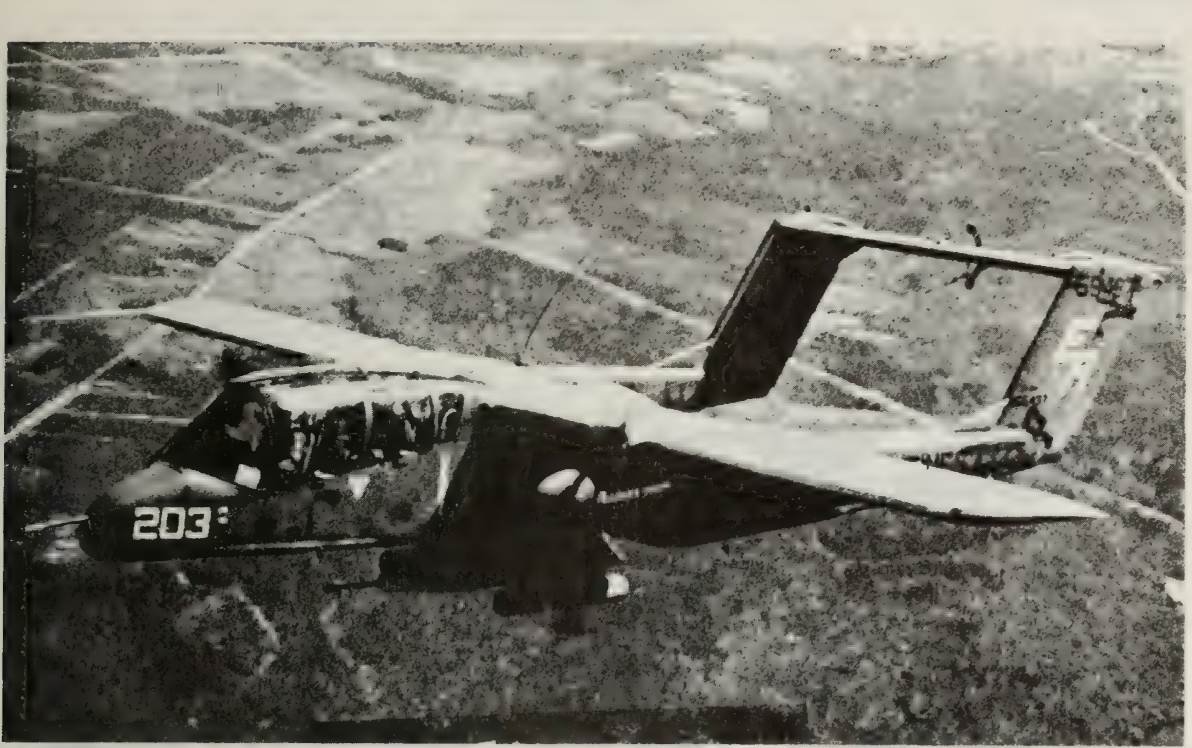


Figure 3.--OV-10.

stations, is 3,600 pounds. With a proper mix of ordnance and external fuel, the OV-10 is able to perform armed reconnaissance or observation in support of the landing force. Other tasks include cargo transport, troop transport and control, and adjustment of artillery and naval gunfire. Time on-station can be computed for planning purposes as 120 minutes (190 minutes with 150-gallon external fuel tank?)minus 33 minutes for each 50-nautical mile radius from the airfield to operating area. Normal crew for the OV-10 consists of a naval aviator and Marine air observer. The OV-10 has no carrier basing capability. (See fig. 3.)

d. EA-6.--The EA-6A is a two-place tactical electronic warfare version of the A-6. It can be configured to detect, identify, locate, record, and jam electronic radiations. The EA-6B is a follow-on electronic warfare aircraft that has been in use by the Navy and is now entering the Marine Corps inventory. It has a crew of four--one pilot and three electronic countermeasures officers. The EA-6B is a sophisticated electronic warfare aircraft, possessing a more powerful jamming capability and increased versatility through an automated electronic warfare system capable of operations within a dense electronic environment. The primary mission of the EA-6 is to support strike aircraft and ground troops by suppressing enemy electronic activity and to obtain tactical electronic intelligence. The EA-6 is operated by the VMAQ-2 squadron and its detachments. (See fig. 4.)

e. RF-4.--The RF-4 is a two-place, multisensor reconnaissance version of the F-4. It has side-looking radar, an infrared sensor and recorder, and vertical, forward, and side-looking cameras, including a panoramic model with rotating prisms for horizon-to-horizon pictures. The crew consists of

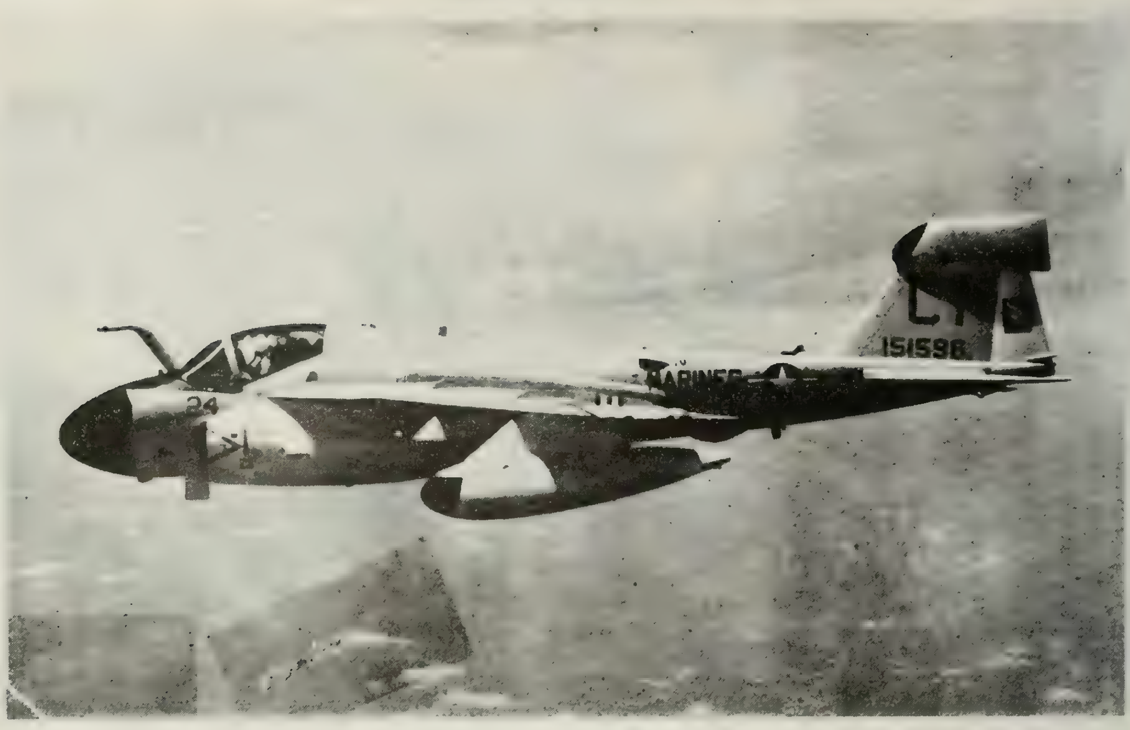


Figure 4.--EA-6.

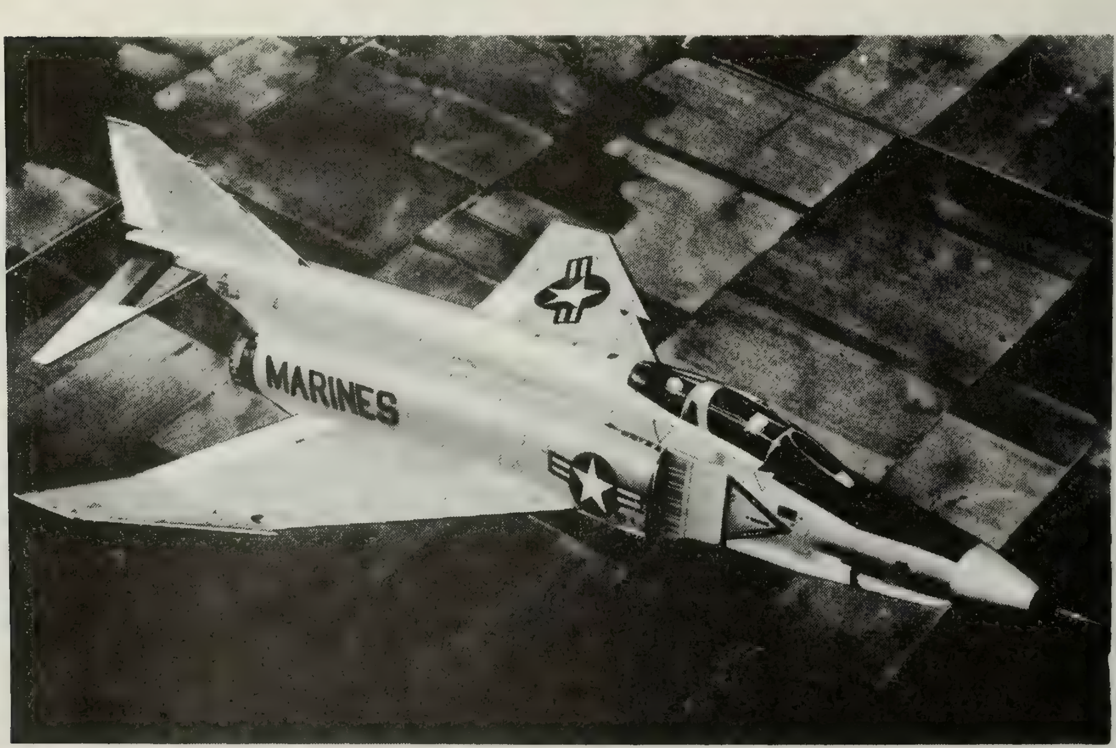


Figure 5.--RF-4.

a pilot and airborne reconnaissance systems officer. The primary mission of the RF-4 is multisensor reconnaissance. It is operated by the VMFP 3 squadron and its detachments. (See fig. 5.)

f. AV-8.--The AV-8 is a light attack, single-engine, jet aircraft. The AV-8 is designed for conventional ordnance delivery during daylight and visual flight conditions. It is capable of vertical takeoff and landing (VTOL) with a limited ordnance payload, short takeoff and landing aboard land or sea bases, and a photographic reconnaissance capability. The AV-8 is operated by VMA squadrons. (See fig. 6.)

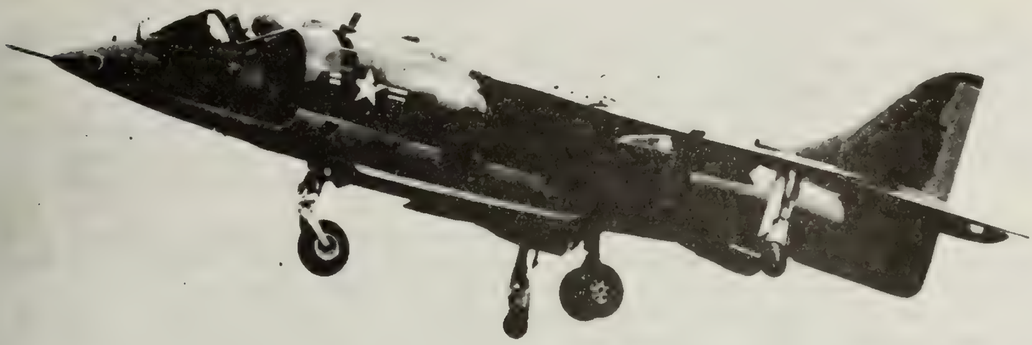


Figure 6.--AV-8.

2303. WEAPONS

Weapons employed by air reconnaissance aircraft are described in FMFM 5-1, Marine Aviation.

2304. MULTISENSORS

For multisensor systems, see chapter 4 of this manual.

2305. MINATURE MULTICHANNEL INBAND RELAY (MINIMIBAR), FORWARD PASS

a. The MINIMIBAR radio set is an airborne relay that receives digital messages from various types of sensors on preset VHF frequencies in the 162-165 MHz band and retransmits these messages on preset VHF frequencies in the 170-174 MHz band to a distant monitoring site. The MINIMIBAR pod provides real-time relay of sensor data; it does not have a storage capability.

b. The forward pass equipment, although still in developmental stages, is capable of receiving and storing in memory several days of digital messages received from either hand-emplaced or air-delivered seismic sensors. Upon command, the forward pass storage units in the ground can burst transmit their stored sensor data to an interrogation unit in a pod aboard most carrierborne fixed-wing aircraft. This interrogating aircraft can then return to the vicinity of advanced or main force shipping or to a ground station and send the stored sensor information by burst transmission to a display unit for readout and analysis. In production models, both the MINIMIBAR real-time relay and the forward pass storage capability will be combined in the same aircraft external pod.

Section IV. ORGANIZATION FOR COMBAT

2401. GENERAL

Marine Corps policy continues to emphasize the close integration of air and ground operations. A Marine air-ground task force with a separate air-ground headquarters is normally formed for combat operations and training exercises in which substantial combat forces of both Marine aviation and Marine ground units are included in the task organization. A Marine air-ground task force includes four major components--a command element, a ground combat element, an aviation combat element, and a combat service support element. (See fig. 7.) For additional information, see Marine Corps Order (MCO) 3120.3-.

a. Command Element.--The commander of the MAGTF is designated by appropriate authority, normally from a source outside the major elements of the task force. In addition to the commander, the command element consists of a separate air-ground headquarters and the communications and facilities required for its support. See paragraph 2401e for a description of the separate air-ground headquarters.

b. Ground Combat Element.--The ground combat element is task organized, tailored to the mission assigned. It is constructed around a combat infantry unit and includes appropriate combat support and combat service support units. Under normal circumstances, there is only one ground combat element in the MAGTF, but the requirement for two or three may occasionally be necessary. When there is more than one ground combat element in the task organization, the commander of the MAGTF directs and controls the ground maneuver.

c. Aviation Combat Element.--This element is a task organization tailored for the conduct of tactical air operations. It includes aviation command units with the necessary air control agencies, combat units, combat support units, and combat service support units which are provided by the MAW and appropriate force units. Air operations are conducted in keeping with the principle of centralized command and control at or above the level

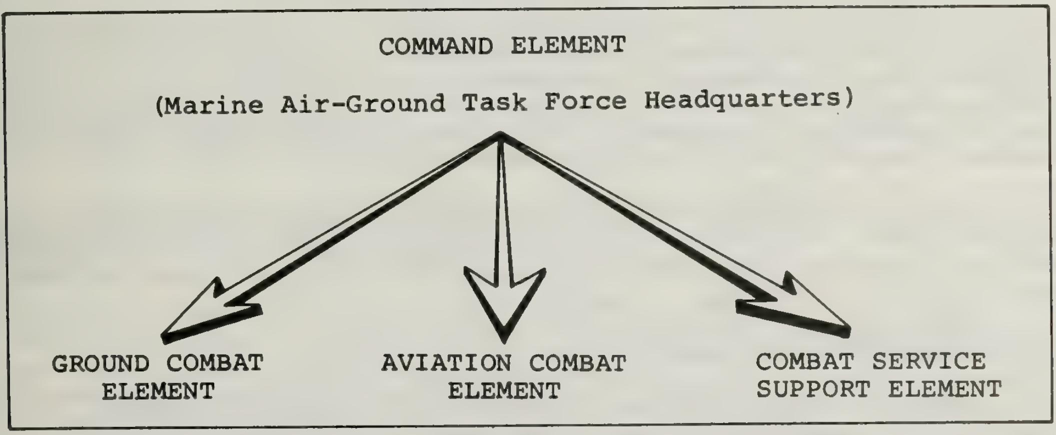

COMMAND ELEMENT
(Marine Air-Ground Task Force Headquarters)
GROUND COMBAT ELEMENT
AVIATION COMBAT ELEMENT
COMBAT SERVICE SUPPORT ELEMENT

Figure 7.--Marine Air-Ground Task Force.

of the MAGTF. When the commander of the MAGTF assumes responsibility for control of air operations, he exercises control through the aviation combat element. Control is facilitated by designating the commander of the aviation combat element as the tactical air commander of the MAGTF.

d. Combat Service Support Element.--This element supports both the ground combat and aviation combat elements of the MAGTF. The combat service support element is made up of various task groupments dependent upon the mission and organization of the aviation and ground combat elements.

e. Air-Ground Headquarters.--The commander is provided with an integrated staff and communication facilities so that he may exercise command of air-ground operations. Like the MAGTF, composition of the headquarters is tailored to the mission. The capabilities of the air-ground headquarters are discussed in the following paragraphs:

(1) Within the task force, direct liaison among the major elements achieves the necessary coordination of air and ground operations. The capabilities of the air-ground headquarters extend, but do not normally duplicate, those of the headquarters of major elements of the task force. Staff services to the commander are oriented principally towards matters which affect the entire task force.

(2) The formation of a separate air-ground headquarters permits subordinate commanders within the task force to direct their attention primarily to their respective elements, while a substantial amount of the staff effort of the MAGTF headquarters is concerned with matters involving higher, adjacent, and supporting commands. The commander makes provisions for direct liaison between these commands and his subordinate commanders for activities which do not require intervention of MAGTF headquarters.

(3) In an amphibious operation, the air-ground headquarters also serves as landing force headquarters, which enhances the direct relationship of the CATF and CLF. The CLF uses the capabilities of his major subordinate commanders in the detailed planning required for the amphibious operation by assigning them appropriate responsibilities for the development of the landing force plan. He may also augment the landing force staff temporarily, particularly for tasks concerned with landing force control agencies.

(4) The major organizational limitation of the separate air-ground headquarters is that it is not permanent. This limitation is partially offset by the permanent assignment of key personnel on an additional duty basis, compilation of files and standing operating procedures (SOP's), periodic activation of the staff for planning command post exercises (CPX's), and frequent inspections of headquarters equipment.

(5) The scope of the MAGTF headquarters will vary with the size of the task force. The Marine amphibious force (MAF), Marine amphibious brigade (MAB), and Marine amphibious unit (MAU) are the three categories of MAGTF's.

2402. MARINE AMPHIBIOUS FORCE

a. The MAF, largest of the Marine air-ground task forces, is normally built around a division/wing team. However, it may range in size from less than a complete division/wing team up to several divisions and aircraft wings together with an appropriate combat service support organization. The MAF is commanded by either a major general or a lieutenant general, depending on its size and mission. It is capable of conducting a wide range of amphibious assault operations and sustained operations ashore. It can be tailored for any intensity of combat and to any geographic environment.

b. The ground combat element of the MAF is usually a Marine division reinforced with appropriate force combat support units. However, the ground combat element can range in size from a division (-) to several reinforced divisions.

c. The aviation combat element of the MAF is usually a Marine aircraft wing task organized to conduct all types of tactical air operations; however, the aviation combat element can range in size from one to several aircraft wings. The aviation combat element is organized and equipped to facilitate its early establishment ashore in amphibious operations, and it is designed for operations in an expeditionary environment. In a Marine amphibious force which contains two or more aircraft wings, the senior wing commander is usually designated the tactical air commander of the MAF.

d. The combat service support element of the MAF is a force service support group (FSSG) which provides maintenance, supply, engineer, motor transport, and medical support to the MAF. It is formed from the assets of one or more division support groups (DSG's), wing support groups (WSG's), and FSSG's depending on the size of the MAF. The components provide combat service support for the MAF through a central facility/location that supports all port, beach, and airfield operations. However, subordinate facilities may be established at separate locations.

e. The MAF may include an organic MAB or MAU as a separate element in order to conduct air-ground operations separated sufficiently in space or time from other MAF elements or to temporarily utilize an in-being, cohesive MAB or MAU when the MAF is a follow-on force. Such operations involving a separate MAB or MAU would normally be of limited duration.

2403. MARINE AMPHIBIOUS BRIGADE

a. The MAB is a task organization which is normally build around a regimental landing team and a provisional Marine aircraft group. It is normally commanded by a brigadier general and is capable of conducting amphibious assault operations of limited scope. During potential crisis situations, the MAB may be forward deployed afloat for an extended period in order to provide immediate response and may serve as the precursor of the MAF. Under these conditions, MAB combat operations may be supported from the seabase, facilities ashore, or a combination of the two.

b. The ground combat element of the MAB is tailored to accomplish the mission assigned; however, the ground combat element of the MAB will normally equate to a regimental landing team.

c. The normal aviation combat element of the MAB is a provisional Marine aircraft group including elements from the wing support group. This provisional Marine air group has substantially more varied aviation capabilities than those of the air element of the MAU. It contains those anti-air warfare capabilities required by the situation. Unlike the MAU, the aviation combat element of the MAB is organized and equipped to be capable of early establishment ashore as existing airfields in the landing area become available. Should the landing area not contain suitable airfields, an expeditionary airfield will be developed using assets organic to the MAB.

d. The combat service support element of the MAB is a logistics support group (LSG) which includes significant resources from the DSG, WSG, and FSSG. Detachments from Navy combat service support resources are also included.

e. Each division/wing team when reinforced by appropriate force troops units has the capability to deploy two MAB's for separate missions should unusual circumstances require such flexibility. Deployment of a third MAB is precluded by lack of sufficient command and control and combat service support assets. Moreover, this same limitation would prevent the deployment of the division, wing, or MAF headquarters while two MAB's are operational. Accordingly, subsequent deployments from the division/wing team would have to be organized either for augmentation of one or both of the deployed MAB's or for amalgamation of all remaining division/wing assets with one or both of the MAB's to form an MAF.

2404. MARINE AMPHIBIOUS UNIT

a. The MAU is a task organization which is normally built around a battalion landing team and a composite squadron. It is normally commanded by a colonel and employed to fulfill routine forward afloat deployment requirements. The MAU provides an immediate reaction capability to crisis situations and is capable of relatively limited combat operations. Although the MAU has the capability for conducting amphibious assaults, such operations are not routinely envisioned. When committed, the MAU is normally supported from its seabase. The MAU is considered to be the forward afloat deployed element of a larger landing force, such as the MAB, which would be constituted as required from Continental United States (CONUS) and/or forward based combat ready Fleet Marine Forces.

b. The ground combat element of the MAU is normally a battalion landing team. Only under unusual circumstances would the ground combat element consist of two battalion landing teams.

c. The aviation combat element of the MAU is normally a composite squadron which may include two or more types of helicopters and elements from the wing support group. In some situations, the composite squadron may also include V/STOL and fixed-wing observation aircraft. Depending on the nature of the operation, a DASC may be provided the MAU for control of aircraft ashore. Under such circumstances, the DASC is normally collocated with the battalion landing team FSCC.

d. The combat service support element of the MAU is a logistics support unit (LSU) and is formed from elements of the DSG, WSG, and FSSG. Detachments from Navy combat service support resources are also included.

e. The preplanned coordinated employment of two MAU's simultaneously in a single combat mission is not contemplated. In situations where employment of readily available forces requires bringing together two MAU's originally formed for separate and independent operations, an MAB will be formed. In exceptional circumstances, the MAU may be a component of a larger MAGTF for a limited period.

2405. INDEPENDENT DEPLOYMENTS

a. Although Marine aviation units normally deploy as part of the MAGTF, there are situations in which independent deployments may be required. Examples of independent operations are:

(1) Deployment of a squadron (fixed-wing or helicopter) aboard an aircraft carrier and under operational control of the Navy.

(2) Humanitarian missions such as flood relief (normally assigned to helicopter squadrons).

(3) Deployment of antiair warfare units such as the light antiaircraft missile (LAAM) battalion, with wing or air force operations.

b. Independent deployments require some augmentation from support units, particularly in the supply and maintenance area. Augmentation from a headquarters and maintenance squadron, Marine air base squadron, force service support group, and in cases of operations ashore, small infantry units will normally be a necessity. Because a unit independently deployed is not readily available to the wing/division team, such operations are not standard procedure.

c. Individual squadron deployments for training purposes are not considered as independent deployments, since the squadrons are still under the control of their parent group.

CHAPTER 3

AMPHIBIOUS OPERATIONS

Section I. INTRODUCTION

3101. GENERAL

The amphibious operation integrates ships, aircraft, weapons, and landing forces in a concerted military effort against a hostile shore. The amphibious assault builds up combat power ashore from an initial zero capability to a fully coordinated striking power in the face of the difficulties of seas, surf, and hydrographic features, in addition to the problems normally encountered in land warfare. Close cooperation and detailed coordination among all participating forces in an amphibious operation are essential to success. There must be a clear understanding of the mutual obligations and of the special capabilities and problems of each component. Thus, the air support elements with their air control system, the assault forces, the logistic support forces, and the shipboard operations are closely related, and a mutual exchange and understanding must exist. This chapter is devoted to providing the insight into the capabilities and problems of landing force aviation in the amphibious operation which will serve as a basis for that mutual exchange and understanding.

3102. AMPHIBIOUS TASK FORCE (ATF)

The amphibious task force is a task organization formed for the purpose of conducting an amphibious operation. It will always include naval forces and a landing force, each of which may have organic aviation. Other air forces may be included as required.

a. Navy Forces.--The Navy element of the amphibious task force may include one or more of the following: transport group, control groups, tactical air control groups, fire support group, shore-based Navy tactical air group, support carrier group, screening group, mine warfare group, reconnaissance and underwater demolition group, tactical deception group, inshore undersea warfare group, close covering group, patrol plane group, air transport group, and an administrative group. The function of these units is discussed in LFM 01, Doctrine for Amphibious Operations.

b. Landing Force.--The landing force comprises the troop units, aviation and ground, assigned to conduct the amphibious assault.

c. Air Force Forces.--When Air Force forces are assigned to the amphibious task force, they will be organized as a separate force or component under the command of an Air Force officer. When the preponderance of tactical aviation is provided by the Air Force for the amphibious operation, the Air Force officer will be designated to direct the total air effort. When the preponderance of tactical aviation comes from the Navy or Marine Corps, the overall air effort will be directed by a naval aviator. In either case, the officer so designated will be responsible for the preparation of the amphibious task force air plan.

3103. LANDING FORCE

The term, "landing force," designates the highest landing force echelon, and the commander landing force is the senior landing force officer in the amphibious task force. Landing force aviation will be organized as a subordinate task organization of the landing force and as such, is discussed in paragraph 3104.

a. Landing Force Functions.--The landing force is specially organized for the following functions:

(1) Embarkation of troops, equipment, and supplies.

(2) Debarkation and landing of troops by air and/or surface units.

(3) Control of assault operations.

(4) Control of naval gunfire and missile support.

(5) Provision and control of air support.

(6) Discharge of cargo from assault shipping, and landing and movement of material across the beaches.

(7) Operation and tactical employment of organic amphibious vehicles and/or aircraft.

b. Landing Force Organization.--The amphibious assault demands that the landing force, at various times during every operation, be organized in one of three functional forms, the latter two of which are peculiar to amphibious operations alone:

(1) Basic Tactical Organization.--This is the conventional organization of the landing force units for combat, involving various combinations of ground and aviation combat, combat support, and combat service support units for accomplishment of missions ashore.

(2) Organization for Landing.--This is the specific tactical grouping of forces for an assault.

(3) Organization for Embarkation.--This is the administrative grouping of forces for the overseas movement.

3104. LANDING FORCE AVIATION

Organic landing force aviation is organized as a subordinate task organization of the landing force. The aviation units comprising landing force aviation are primarily organized, trained, and equipped for support of ground units in amphibious operations. The particular size and structure of the aviation combat element is commensurate with the task assigned to the landing force. Current Marine Corps doctrine dictates a direct role for landing force aviation units. The landing force functions and organization described in paragraph 3103, are directly applicable to the aviation element. The manner in which they are individually applied will be covered in subsequent paragraphs.

Section II. EMPLOYMENT OF AIR RECONNAISSANCE

3201. GENERAL

Air reconnaissance, both rotary and fixed-wing, are employed primarily as observation, multisensor imagery, and electronic reconnaissance. The distances involved, the tasks assigned, the area and scope of operations, the base area, and the compatibility with other air traffic will all affect the operations of air reconnaissance aircraft.

3202. PRINCIPAL CONSIDERATIONS

The principal considerations in the employment of air reconnaissance aircraft are:

a. Availability.--The numbers, types, and capabilities of aircraft assigned to the task organization and in an operationally ready maintenance status.

b. Aircraft Supportability.--Availability of assigned aircraft to support the concept of operations.

(1) Availability of airfields and airfield sites available within operating distance of the AOA.

(2) Enemy capabilities and dispositions, particularly the location, type, and density of enemy antiaircraft installations.

(3) Requirements for air, naval gunfire, and artillery fire control.

3203. CONCEPT OF OPERATIONS

The concept of operations is the key to the interaction between the assault troops and air reconnaissance support. The CATF's concept will revolve around either the amphibious assault, the amphibious demonstration, the amphibious raid, or the amphibious withdrawal. The principals discussed here will be applicable to each of these. The CLF's concept will include the formation for landing, the maneuvers for capture of the beachhead(s), and the principal landing force objectives. From this, the air reconnaissance support requirements pertaining to visual reconnaissance and surveillance during and after the landing can be derived.

3204. METHODS OF EMPLOYMENT

The methods of employing air reconnaissance are considered by a tactical commander, commencing during the planning phase and continuing through the execution of an amphibious operation. Air reconnaissance operations provide a major means of collecting current information concerning the terrain, weather, hydrography, and the enemy situation in the area of operations. Air reconnaissance operations produce information that must be processed and analyzed to extract any intelligence data that may be present. These operations are planned and coordinated primarily under the staff cognizance of the G-2/S-2 officer.

a. Operational Subdivisions of Air Reconnaissance.--Air reconnaissance can be subdivided into two general areas:

(1) Tactical Air Reconnaissance.--Tactical air reconnaissance is the use of air vehicles to obtain information concerning terrain, weather and the location, disposition, composition, movement, installations, lines of communication, electronic and communication emissions of enemy forces. Also included are artillery and naval gunfire adjustment, and the systematic and random observation of the ground battle area, targets, and/or sections of airspace.

(2) Strategic Air Reconnaissance.--Strategic air reconnaissance provides intelligence information required for the formulation of plans and policies at the national and international level.

b. Fundamentals of Air Reconnaissance.--Marine air reconnaissance systems are designed to obtain information of a tactical nature to be used in the planning and conduct of air-ground operations. Occasionally, Marine units may utilize the products of strategic reconnaissance or be tasked to perform strategic missions. The aircraft, equipment, and flight crews produce only raw data that must be processed and disseminated through the Marine Corps intelligence system before it becomes valuable to commanders and their staffs. Units specifically tasked for air reconnaissance operations within the Marine Corps are the VMO, VMFP, and VMAQ. Air reconnaissance missions are flown in response to the specific requests. The units do not fly missions unless supported commands request specific items of information desired.

(1) Purpose.--Air reconnaissance is employed to:

(a) Obtain multisensor imagery of areas and points of interest.

(b) Provide and maintain surveillance of enemy activities or areas of interest.

(c) Conduct airborne electronic reconnaissance.

(d) Support the direction and adjustment of artillery and naval gunfire and control close air support strikes.

(2) Tactical Considerations.--Basic tactical considerations in the execution of an air reconnaissance mission provide for:

(a) Avoiding offensive combat action in order to deliver information to the supported commander as quickly as possible.

(b) Exploiting surprise and speed to avoid detection protects the unarmed reconnaissance aircraft.

(c) Conducting actual or dummy missions outside of the landing area to deceive the enemy of the MAGTF's actual area of interest.

(d) Integrating all sensor systems under a single coordinated control system to ensure that their individual capabilities complement one another, to permit comparison and confirmation of information, and to ensure backup in case one of the sensor systems is unable to obtain the needed information.

(e) Measures to support a reconnaissance mission may include airstrikes, electronic countermeasures, interceptor escort, and inflight refueling.

c. Types of Air Reconnaissance.--All air reconnaissance operations can be categorized into three major types: visual, multisensor imagery, or electronic. Any combination of these types may be employed in a single mission.

(1) Visual.--Any airborne platform provides the capability to conduct visual air reconnaissance operations. Either a trained air observer or the pilot acts as the sensor system by visually searching a route, point, or area. When the enemy is detected, visual air reconnaissance is frequently related to offensive action such as artillery, naval gunfire, or air support. When requesting or planning visual reconnaissance, the following capabilities and limitations should be considered.

(a) It provides immediate information on the disposition of friendly and enemy forces.

(b) It can seldom be planned beyond a day-to-day basis, except during the initial phases of an amphibious operation due to the fluid nature of combat operations.

(c) It is conducted at low altitudes requiring close coordination with supporting arms.

(d) The combination of low altitude, division of attention, and prolonged operations in one area increases vulnerability to enemy fir.

(2) Multisensor Imagery.--Multisensor imagery is the recording of information obtained by a given sensor device. Reconnaissance sensor devices include both hand-held and specifically designed aerial cameras, all types of airborne radars, devices which provide graphic information by interception of radar signals, and infrared devices which sense differences in radiated thermal energy.

(a) Air imagery planning involves techniques for use of all the capabilities of these systems. Multisensor imagery missions are generally employed to detect and pinpoint the location of enemy installations, facilities, and force concentrations. Mapping and poststrike assessment are other examples of multisensor imagery air reconnaissance. Because of the diverse capability, a single mission may encompass both direct and indirect air support tasks.

(b) The air reconnaissance system presently has the capability to expose and develop nine times as much film as finished prints (approximately 27,000 feet of film to 3,000 finished prints daily). Supported units should specify that a trained photo-interpreter evaluate new imagery and provide a report of pertinent intelligence. Request finished prints only when they are necessary in planning (e.g., proposed areas of operations, helicopter landing zones, or approach and retirement lanes).

(c) Photography produces the most familiar, directly recognizable image for use by the untrained observer. It offers the highest resolution of the imagery systems, processing and production times are relatively short and it offers the flexibility of varied cameras, films, viewing angles, and scales. Photography is limited by the conditions of poor visibility, cloud cover, and darkness.

(d) Side-looking airborne radar can provide acceptable imagery during periods of darkness and in conditions of light rains, smoke, haze, or dust. As in any radar system, SLAR can be detected and is susceptible to countermeasures.

(e) Infrared reconnaissance is effective in periods of darkness or reduced visibility conditions. Portrayal methods include a scope presentation for instantaneous crew viewing and imagery recording on film for future study.

(f) Because of the capabilities and limitations of each type of multisensor imagery, two or more systems should be utilized when possible, including visual reconnaissance to complement and enhance the validity of the information recorded.

(3) Electronic.--The collection of information concerning electronic emitters in an area of operations, or potential operations, through the use of electronic sensing and recording devices is called electronic reconnaissance. This information is evaluated, interpreted, and analyzed to produce local electronic intelligence on the tactical level. The intercept equipment includes facilities for receiving a signal, then determining the direction, source, and characteristics of the signal. Intercept equipment does not emit signals of its own; therefore, it is capable of operating continuously without alerting the enemy. Electronic intercept equipment is particularly valuable under conditions of reduced visibility when the enemy is using electronic means for navigation and fire control. This application is most useful for offensive antiair warfare purposes, but air defense may also be served if incoming enemy missions are detected prior to surveillance radar contact. This surveillance function may be performed by both ground and airborne equipment.

3205. FUNCTIONAL INTEGRATION

The functional integration of air reconnaissance means with aviation assets from other functional areas is an absolute necessity. Normally in the sequence of application of force by air means, the air reconnaissance forces will be the first to be employed. The requirement for integration commences in the fuel pits, extends down taxi ways, crosses flight decks, entails launch and recovery operations, and includes coordination of the effort in the application of offensive military power ashore. The orchestration of reconnaissance, electronic warfare, combat air patrol, close air support, and vertical assault aircraft operating in coordination with friendly artillery and naval gunfire in support of friendly ground units is a major task.

Section III. PREPARATION

3301. GENERAL

a. Preparation for the amphibious operation by air reconnaissance elements takes many forms. Training must be conducted to ensure that personnel and organizational readiness level requirements are met. Rehearsals are required to test equipment, plans, timing, combat readiness, and communications. Finally, preparation must include measures for providing operational security.

b. The aerial reconnaissance and surveillance plan for the amphibious task force is prepared jointly by the CATF and the CLF. This plan reflects the reconnaissance requirements of subordinate landing force units and is adjusted to the capabilities of the aerial reconnaissance and surveillance agencies. When planning for employment of visual and imagery reconnaissance, the CLF considers the most effective use of the available means. The intelligence officer of the landing force prepares an aerial reconnaissance and surveillance plan (see app. A). See appendix B for a format of the aerial imagery plan.

3302. TRAINING

Training requirements vary with types of aircraft and the nature of the planned operation. The following training tasks are typical of those that may have to be conducted in preparation for an amphibious assault:

a. Landing and Takeoff Techniques.--Any requirements for special landing and takeoff techniques must be recognized and procedures established to compensate accordingly. Considerations must be given to STOL and shipboard operations.

b. Battlefield Illumination.--Training by aircrew and ordnance personnel, relative to battlefield illumination, is necessary and should be carefully supervised.

c. Navigation and Pilotage.--When the enemy forces are capable of retransmission of beacon and air direction signals that result in erroneous navigation inputs, the pilot must rely on dead reckoning navigation. Thus, aircrews must be trained to maintain and check positions by the computation of time and distance, and maps and charts.

d. Control of Supporting Arms.--Aircrews, both pilot and air observer, should be trained in the control of close air support aircraft and in all adjustment procedures from the air for naval gunfire and artillery.

e. Multisensor Imagery.--Aircrews must have the opportunity to obtain multisensor imagery, both from high performance jet aircraft and light observation or rotary-wing aircraft. Imagery interpreters must be given the opportunity to train in the interpretation of multisensor imagery.

f. Remote Sensor Delivery and Monitoring.--Aircrews should be trained in the techniques involved in the air delivery of remote sensors. Further training for Marine air observers is required in monitoring the delivered sensors utilizing the USQ-46 PORTATALE.

g. Security.--Practice for security in operations is a necessity. In a sophisticated environment, secure voice operations are mandatory and the enemy capabilities might be so great as to require total radio silence throughout the conduct of a visual reconnaissance mission. In this case, training in the use of visual signals, such as panel codes, pyrotechnics, and aircraft maneuvers, should be considered.

3303. REHEARSAL

a. Rehearsal is the period during which the prospective operation is rehearsed for the purpose of:

(1) Testing the feasibility of plans, timing of detailed operations, and combat readiness of participating forces.

(2) Ensuring that all command and staff echelons are totally familiar with plans.

(3) Testing communications.

b. The decision to conduct an integrated rehearsal involving the major elements of the amphibious task force rests with the CATF. This decision is made early in the planning phase. In the event that integrated rehearsals with naval elements are not possible, the CLF usually requires a staff rehearsal as a minimum. This is done to check the communication system and staff functioning of all assault elements, combat support, and combat service support units. Integrated rehearsals involving all troops and support elements are desirable, though in some cases, may not be possible.

c. During rehearsals, conditions are made as realistic as practicable. However, flight distances might be reduced and other measures taken to minimize aircraft operating time in order to ensure maximum aircraft availability for the actual assault. Rehearsals of control agencies and coordination with supporting arms is of utmost importance.

d. For a discussion of rehearsals, see LFM 01, Doctrine for Amphibious Operations.

3304. OPERATIONS SECURITY

Operations security encompasses those actions that are necessary and appropriate to deny the enemy information concerning planned, on-going, and completed operations. All personnel must be forewarned as to the threat aspects in various areas such as:

a. Electronic Surveillance.--The hostile capabilities in the areas of radar, identification friend or foe (IFF), and similar active emitters.

b. Signals Intelligence.--The hostile capabilities in the area of communications, electronics, and telemetry communications.

c. Human Intelligence.--The hostile capabilities and practices in the areas of espionage; subversion; exploitation of lost, captured, or missing documents; and prisoner interrogation.

d. Open Literature.--The hostile capability to exploit news media releases and technical publications divulging information relative to weapons, tactics, and operations and to exploit unclassified military communications, such as weather and flight plan traffic, by overt means.

Section IV. OPERATIONAL DEPLOYMENT

3401. GENERAL

The operational deployment of air reconnaissance forces refers to the relocation of the forces to specific areas of operation. The methods involved in the movement of such forces are oftentimes complex. The commander must consider the availability of aircraft and needed operational and support facilities in proximity to the AOA. The decision to operationally deploy all or a part of the desired forces is based upon multiple factors; i.e., cost, tasks to be accomplished, supportability, and defense requirements. All options are considered in the decision making process. The commander of the landing force has a great degree of flexibility in the location of his air reconnaissance assets; however, there are certain aspects to be considered when relocating specific aircraft overseas; e.g., transportation of the OV-10 from CONUS to an overseas advanced base.

3402. ADVANCED BASE OPERATIONS

Advanced base operations are conducted from a base in or near the theater of operations to support military operations. Such operations will commonly be conducted by fixed-wing air reconnaissance aircraft as their range capabilities permit such action. Helicopters often will not have the range capabilities to be thus deployed; however, such a method of deployment is not to be ruled out. In fact, it is most common when independent deployments are conducted. Two distinctive types of fields are to be considered for advanced base operations. These are the "redeployment airfield" and the "advanced landing field." The support advantages inherent in the "redeployment airfield" make it the most desirable choice of the two listed. The "advanced landing field," however, will serve the Marine Corps needs and will be that type of airfield most commonly encountered. Types and extent of support required and the personnel, equipment, and supplies to provide the support may be extensive when deploying forces to advanced bases. The defensive requirements to guard against attacks by enemy air, land, and naval forces must be weighed in concert with the offensive gains envisioned by the landing force.

a. Fixed-Wing Operations.--To support an amphibious operation from an advanced base, high performance fixed-wing operations are best conducted at ranges not greater than 300 nautical miles from the force beachhead. Low performance (OV-10) fixed-wing operations are best conducted at ranges not greater than 100 nautical miles from the force beachhead. This permits sufficient operating time in the area of operations to adequately utilize the assigned aircraft. In addition, the control of air operations by the tactical air commander is greatly enhanced if distances between the advanced base and the force beachhead are not excessive.

b. Helicopter Operations.--Advanced base helicopters operating in support of an amphibious operation or independently deployed are normally not located at distances greater than 50 nautical miles from the force beachhead or area of operations. A discussion of methods used in employed forces deployed to advanced bases is contained in section V of this chapter. The principle limitations on basing helicopters at a distance from the force beachhead are reflected in the transit times required. Aircraft utilization and aircrew fatigue factors are based upon total flight time and include the transit times to and from the advanced bases. Additionally, helicopter vulnerability to the highly mobile modern air defense weapons dictate dedication to extensive protective forces to cover the transit lanes of approach to and exit from the force beachhead area.

3403. CARRIER BASING

a. Carrier basing fixed-wing air reconnaissance aircraft is a viable method of deployment.

b. The carrier basing of helicopters is the optimum method of initial deployment. For purposes of discussion herein, shipboard deployments of all types are addressed as carrier basing. The preponderance of emphasis will be placed on three ships: the LHA, LPH, and LPD. The CH-53, CH-46, UH-1, and AH-1 have been deployed for extended periods of time aboard LPH and LPD vessels during training and combat operations. During these deployments, the aircraft have proven fully compatible with these vessels. This method of deployment, aboard amphibious vessels, has many advantages for the helicopter units. The units are collocated with the assault troops, thus allowing for exchange of information during planning and training evolutions. The amphibious vessels provide maintenance work spaces and bench equipment, thus permitting the organizational equipment to be embarked for movement ashore. The defense protection of the squadron personnel and equipment is inherent in the defense of the amphibious force; thus, squadron security tasks are minimized.

3404. EARLY PHASING ASHORE

a. Helicopter units are displaced ashore at a time calculated to cause minimum interference with other landing operations and yet, be compatible with landing force requirements. The establishment of helicopter operating bases ashore and severing of dependence upon shipborne bases is a progressive process. Initially, flights of helicopters may operate from roughly prepared sites, receiving limited logistic support ashore. Aircraft maintenance during this period is accomplished aboard ship or at other developed bases in the area. The personnel and equipment necessary to service and perform maintenance for helicopters are transported ashore early. This may be accomplished by the organic aircraft of the helicopter unit or by landing craft.

b. Helicopter units which operate ashore for extended periods require establishment of intermediate level maintenance and supply facilities ashore. During the interim period, flight elements of the helicopter unit generally operate from locations ashore for limited periods, returning to ships for intermediate level maintenance with a gradual lessening of dependence on their shipborne bases, until intermediate level maintenance facilities are operating ashore.

c. Until such time as fixed-wing visual reconnaissance assets become available during the initial phase of an amphibious operation, helicopters will be used to accomplish visual reconnaissance missions.

Section V. EXECUTION

3501. GENERAL

Air reconnaissance requires careful planning to achieve optimum results. The many assets available to the CLF relative to air reconnaissance during all phases of an amphibious operation provide a basis for acquiring information of an intelligence nature. There are many and varied options that a tactical commander considers when employing air reconnaissance assets.

3502. PRE-D-DAY OPERATIONS

a. Preassault operations relative to aerial reconnaissance will normally be limited to multisensor imagery and tactical electronic reconnaissance. These air reconnaissance type operations are conducted for the following purposes:

(1) To gain information of the enemy, installations, and terrain.

(2) To acquire imagery of specific areas in the FBHA; e.g., objective areas, roads and bridges, landing zones, approach and retirement routes, etc.

b. The capability exists for visual reconnaissance missions to be conducted from high performance aircraft during pre-D-day operations. However, there are many factors to be considered if this option is desired, primarily, availability of appropriate aircraft, locations of airfields, command and control, and support required.

c. Several air reconnaissance problems unique to an amphibious operation during pre-D-day operations are:

(1) Complications relative to command and control when operating all aviation assets simultaneously in a task force.

(2) Coordination and liaison with all intelligence collection agencies in the amphibious task force, especially as related to air reconnaissance missions.

(3) Operating in a mid/high intensity threat environment.

d. Air reconnaissance is an integral part of the overall effort in support of the amphibious operation during pre-D-day operations. Offensive antiair warfare operations are conducted to neutralize or destroy enemy aircraft, missiles, and ground weapons that endanger friendly operations. Preplanned offensive air support missions are directed against targets selected from multisensor imagery and electronic reconnaissance on and in the vicinity of the landing beaches, helicopter approach and retirement lanes, and helicopter landing zones. Additionally, other types of tactical air pre-D-day operations are naval gunfire spot missions, antisubmarine warfare, psychological operations, electronic warfare operations, deception operations, and search and rescue operations. The total effort is a complex and monumental undertaking and the acquisition of information by means of air reconnaissance assets is vital to the accomplishment of the mission.

3503. D-DAY OPERATIONS

In air operations during the assault, regardless of the size of the MAGTF, emphasis is placed on close support of the assault forces, while execution of all other required air operations continues. Offensive and defensive air operations begun prior to assault operations are maintained, and preparation of the landing area continues. During this phase, visual reconnaissance utilizing the Marine observation squadron augments the other air reconnaissance collecting agencies; i.e., VMFP and VMAQ. This combination of air reconnaissance assets provides the landing force commander with real and near real time intelligence.

a. Command and Control.--Command and control of air reconnaissance aircraft follow the same procedures as other aircraft operating in the AOA.

b. Operations and Intelligence.--The intelligence collection effort is based on the premise that timely intelligence is required prior to any tactical maneuver in the FBHA. Understandably, many other factors are also directly involved; e.g., logistics, operations, composition of the task force, communications, etc., but air reconnaissance is a vital part of the total picture relative to acquiring information. The combination of visual reconnaissance, multisensory imagery, and electronic reconnaissance on a continuing basis will provide the CLF with current information on the enemy force. The Marine air observer operating from either fixed-wing aircraft, helicopters, or both, has the additional capability to call for and adjust naval gunfire and airstrikes.

c. Coordination of Air-Ground Reconnaissance Assets.--Close coordination and liaison must be established between the G-2/S-2 and G-3/S-3 relative to the tasking of aviation intelligence collection agencies. Additionally, procedures for rapid processing and dissemination of intelligence information to the tactical commander must be established. During an amphibious operation, integrated air/ground reconnaissance efforts require a concerted effort by all commanders and staff to ensure tactical commanders receive real and near real time intelligence for critical decisions affecting D-day operations.

3504. POST-D-DAY OPERATIONS

a. Post-D-day air reconnaissance operations continue to support the landing force with increased emphasis on acquiring timely information on enemy dispositions. Plans must provide continuous and adequate air reconnaissance support to include consideration of the phasing and transition from carrier based to land based air reconnaissance support. In those instances where there are no suitable airfield facilities for fixed-wing reconnaissance aircraft; e.g., the OV-10, the air element of the landing force will establish expeditionary facilities from resources available to each MAG. Visual reconnaissance missions may be conducted from carrier based or land based helicopters until such time as fixed-wing assets become operational from expeditionary facilities. The various expeditionary airfield components have been designed to permit the tactical commander to have the required flexibility desired for assembling a variety of airfield configurations.

b. As soon as practical, the CLF establishes air control facilities ashore in order to provide increased surveillance, more rapid response, and a landward extension of the amphibious task force's weapons control capabilities. Initially, air control agencies ashore operate in a standby status monitoring all air control circuits. Once the agencies ashore are satisfactorily established, as the tactical air situation develops, and upon recommendation of the CLF, the CATF decides whether to phase responsibility for air control ashore and according to what type and degree. As the MACCS becomes functional, the CATF may pass all or portions of air control responsibility to the CLF. In a continuing sequence, the agencies afloat are relieved of responsibility but continue to monitor the appropriate categories of control, participating when necessary. Regardless of the degree of participation, these afloat agencies will remain prepared to act as backup or alternate agencies until the termination of the amphibious operation. LFM 01, Doctrine for Amphibious Operations, provides information relative to control procedures of an amphibious operation.

3505. TERMINATION OF THE ASSAULT PHASE

The termination of an amphibious operation is predicated on the accomplishment of the mission of the amphibious task force. LFM 01, Doctrine for Amphibious Operations, sets forth the guidelines for determining specific conditions.

Section VI. LOGISTIC SUPPORT CONSIDERATIONS

3601. GENERAL

a. The aviation logistic system must be capable of incremental introduction of supply and support into the objective area at a rate consistent with the tactical situation and the shore facilities available. A typical phasing ashore will progress from austere control, operations, and logistic requirements to full group/wing sustained operations and the necessary support required.

b. The establishment of a Marine aviation element of any size ashore is a major logistic problem involving:

(1) The movement of heavy and complex equipment and combat aircraft by surface and air.

(2) The installation of dispersed facilities, often in relatively underdeveloped areas, which requires extensive engineering effort.

(3) The provisions of great quantities of supplies, principally fuel, spare parts, and aircraft munitions.

c. When established ashore, portions of the Marine aviation element are often dispersed over a wide area, sometimes as much as several hundred square miles. Included in this area of operation is a complex of airfields, helicopter operating sites, radio and radar installations, antiaircraft missile battalions, command and control agencies, and maintenance and supply facilities. The construction of airfields and the installation of supporting activities will require engineer support which cannot be provided by units organic to Marine aviation.

3602. SUPPLY AND MAINTENANCE

a. Assuming that the decision has been made to operate aircraft from bases ashore, within or near the objective area, aircraft can begin arriving almost as soon as a usable airfield has been seized and secured or one constructed. Like all elements of the assault force, however, they cannot operate successfully unless they are properly supported by the supply chain.

b. In terms of the incremental phasing of supplies ashore, the support essential for aviation units is somewhat the reverse in its sequence of demands when compared with that of ground units. Whereas ground units start at a relatively low level of need and build to a more substantial demand as the operation expands, aviation units require a sizable infusion of logistic support from the outset.

(1) Refueling facilities are essential and will normally require either the manning of emplaced systems or the establishing of tactical airfield fuel dispensing system (TAFDS) units as well as the transfer of fuels ashore from tankers.

(2) Ordnance will need to be stockpiled and the associated storage areas will likely need to be constructed for operational use.

(3) The avenues of supply must be kept open and operating, and all levels of maintenance need full logistic support to ensure the maximum availability of aircraft for employment in air reconnaissance roles. For specific information concerning maintenance levels and logistic requirements, see FMFM 4-1, Combat Service Support for Marine Air-Ground Task Forces.

3603. ENGINEERING REQUIREMENTS

The Marine aircraft wing is largely dependent upon engineer support by other forces for base construction, repair, and development. This support is normally supplied in amphibious operations by force engineers and/or Navy mobile construction battalions (MCB's). The needs of the various units within the wing are varied and the numerous engineering requirements reflect the variety.

a. Helicopter Operating Sites

(1) Displacement.--Displacement of helicopter units from an amphibious assault ship for operations ashore requires the preparation of suitable helicopter operating sites.

(2) Surface.--Skid helicopters, such as the UH-1 and AH-1, may operate off dirt pads if the soil is sufficiently firm.

(3) Rotor Clearance.--In addition to the construction of a suitable helicopter pad, consideration must be given to the requirements for a safe rotor clearance between helicopters for taxiing, parking, and during rotor engagements required for blade tracking and other maintenance procedures.

(4) Revetments.--If the helicopter pad is to be within range of hostile fires, it is advisable to install revetments in order to reduce the possibility of damage to more than one helicopter from any single incoming round, should an attack occur.

b. Operating Strip for Fixed-Wing Observation Aircraft

(1) Area Requirement.--Initially, any cleared level ground, free of major obstacles may be suitable for observation squadron (VMO) operations. The size required will vary depending upon the temperatures, field altitude, and operational weight of the aircraft. Consult the appropriate operational publications or NATOPS manual for required data. Such facilities, however, may not be suitable for sustained operations. Necessary improvements should be programmed in a timely manner to support the projected tempo of operations.

(2) Surface Requirement.--A highly satisfactory surface is provided by pierced steel planking. Oiled dirt strips or even bare earth are also usable if the soil is sufficiently firm. The relatively small effort required to clear a dirt strip is within the capability of most engineer units.

3604. MULTISENSOR PROCESSING REQUIREMENTS

a. The VMFP squadron has the capability to process and reproduce multisensor imagery flown by organic aircraft.

b. The VMO squadron does not have the capability to process or reproduce either the hand-held photography (35mm) taken by Marine air observers or the vertical strip photography employing the KB-18A camera (70mm) in organic aircraft. The Marine aircraft wing is dependent upon Naval support while afloat or Marine ground elements while ashore. Support requirements include:

(1) Personnel to process and reproduce film.

(2) 35mm and 70mm film processing equipment.

(3) A power source provided by standard Marine Corps generator, 115 volt, 60 cycle, single phase.

(4) Fresh water.

(5) A dark room area for processing of film (blacked out tent, van, truck, etc.).

c. Personnel and equipment normally are requested from division size units to support VMO in the processing of multisensor imagery.

3605. ELECTRONIC INTELLIGENCE PROCESSING AND REPORTING REQUIREMENTS

a. The VMAQ squadron has the capability to process and report on electronic information collected by organic aircraft. The AN/TSQ-90/TERPE segment of the MAGIS performs this function. The MAW is dependent upon Naval support while afoat or Marine ground elements while ashore. Support requirements include:

(1) Personnel to operate TERPE segment equipments, process mission tapes, and produce reports.

(2) A 60-cycle and 400-cycle power source provided by standard Marine Corps generators.

b. Personnel and TERPE segment equipments are organic to the VMAQ squadron and are further defined in section V.

Section VII. SPECIAL OPERATIONS

3701. GENERAL

Air reconnaissance aircraft are involved in special operations and operate under conditions requiring special considerations. These are addressed here to assist in visualizing these operations and the variables introduced by the special considerations.

3702. OTHER TYPES OF AMPHIBIOUS OPERATIONS

The other amphibious operations to be addressed are withdrawals, demonstrations, and raids. They are further discussed in LFM 01, Doctrine for Amphibious Operations.

a. Amphibious Withdrawals.--An amphibious withdrawal is characterized by a progressive reduction in the size and firepower of the friendly force. The loss of firepower from retrograded artillery and tanks must be offset by a corresponding increase in protective fires by air and naval gunfire. Rapid removal of covering forces can be provided by helicopters which reduces the exposure time of a relatively small force to enemy action.

b. Amphibious Demonstration.--The amphibious demonstration is an attempt to delude the enemy and force him into a course of action which is unfavorable to him. Helicopter waves may approach landing zones, an airborne DASC may be utilized for communication deception, mock paradrops may be employed, and inflight refueling support may be needed for the aircraft engaged in the bombardment associated with such demonstrations.

c. Amphibious Raids.--Amphibious raids are swift incursions into enemy territory. Operations security is stressed to ensure surprise, and the use of helicopters to introduce and withdraw the raid force is preferable since they provide speed and mobility, so useful in these situations. Aerial refueling is a likely need, as supporting arms coverage will predominately be that provided by air. In addition, an antiair warfare covering force may require aerial refueling.

3703. ENVIRONMENTAL PROCEDURES

The environment plays a major role in air reconnaissance aircraft operations. Both the aircraft and support personnel suffer from restrictions imposed and hazards created by the environment. These factors are discussed below with information concerning their effects upon air reconnaissance.

a. Cold Weather Operations

(1) Cold weather operations present some unusual problems for air reconnaissance aircraft. Normal operations call for operating from temporary forward area facilities. Increased materiel failures and increased maintenance requirements can be expected.

(2) Mission response time will decrease; bulky clothes, cold temperatures, wind, ice, snow, sleet, and freezing rain will all slow down the tempo of operations. Maintenance efforts should be sheltered from the

effects of the weather or even slower response time and lower aircraft availibility will result.

(3) Blowing snow, both from wind and/or rotor wash, may be a real restriction on the time or place of helicopterborne landings. Fixed-wing observation aircraft (OV-10) are not capable of flying in icing conditions due to the lack of deicing equipment.

(4) A light snowfall or a low overcast, coupled with total snow coverage on the ground, can easily induce vertigo. Therefore, preparations must be made for the conduct of all flights under instrument flight conditions. This requires that landing zone control measures be emphasized.

(5) Care must be taken to ensure the surface stability of airstrips/landing zones. Areas covered by snow may be either thin ice or frozen crust covering water or deep mud which will inhibit or preclude landing or subsequent movement.

(6) Icing conditions present a major consideration in the employment of observation aircraft and helicopters. The presence of freezing rain and other icing conditions are severe restricting factors for aircraft not appropriately equipped.

b. Desert Operations.--As defined in this manual, a desert is a dry, barren region, largely treeless and sandy. The topography may vary from flat terrain to irregular mountain heights. Meteorological conditions include drastic changes in temperature and wind velocity. Commanders must include considerations for:

(1) Employment

(a) Navigation is made difficult by the lack of reference points. Aircrews will be required to carry both tactical maps and aeronautical charts. Dead reckoning and electronic aids must be used to supplement the maps, charts, and photographs used to accomplish visual reconnaissance.

(b) Vulnerability of aircraft in flight is increased as lack of terrain features permit long range observation and detection. Long range air reconnaissance missions may include an electronic warfare capability during both day and night operations.

(c) Visual reconnaissance will be conducted at higher altitudes, thereby not producing the detailed information normally reported.

(2) Personnel

(a) Daily water consumption will vary from 12 quarts to 24 quarts a day per individual. Aircrews must have access to water during flight operations.

(b) Due to the nature of amphibious operations, personnel may not have sufficient time to acclimatize to desert conditions. Should this be the case, additional aircrews and support personnel will be required to maintain the high tempo of operations characteristic of the amphibious landing.

(c) Blowing sand and dust common to desert areas will result in irritation and partial loss of visual abilities if preventive measures are not taken.

(d) Maintenance personnel must use gloves to protect their hands from burns when working on aircraft and support equipment due to heat absorption by metal objects.

(3) Weather

(a) Although daytime temperatures may be high, low temperatures may be encountered at night.

(b) Windstorms often arise suddenly, accompanied by blowing sand. The sandstorms are frequently so severe that they totally obscure vision and prohibit safe landing even when using mechanical aids.

(c) Rainfall, although rare, is characterized by torrential thunderstorms. Base areas must be located to preclude damage from the resulting flash floods.

c. Jungle Operations.--For the purposes of this manual, jungle is defined as an area located in the humid tropics wherein the land is covered with such dense growth of trees and other types of associated vegetation that it impedes military operations. In jungle operations, commanders must include considerations for:

(1) Employment

(a) Due to the difficulties encountered in surface movement, visual reconnaissance plays a major role in jungle operations.

(b) Tall trees and overhead canopies restrict target acquisition and fields of fire for the enemy, thereby permitting the visual reconnaissance aircraft to conduct its mission at lower altitudes.

(c) Control and adjustment of supporting arms are accomplished more effectively from the air than from the ground, where the forward air controller's or forward observer's visions on a target area are hampered by dense foliage.

(2) Preventive Medicine Program.--Personnel in jungle environs are susceptible to fungus type infections and are often exposed to malaria. Aviation units engaged in jungle operations must pursue a strong preventive medicine program. Innoculations and adequate laundry and bathing facilities are mandatory. Due to the fixed nature of aviation facilities, an active insect control program may be pursued to reduce the threat of disease spread by such pests.

(3) Weather

(a) Normally, a combination of high temperatures and humidity are encountered.

(b) Periods of extended and/or heavy rainfall are common in tropical areas. This, in turn, will result in restricted flight operations due to the resultant reduced visibility.

3704. COUNTERINSURGENCY

Counterinsurgency is discussed in detail in FMFM 8-2, Counterinsurgency Operations. The air reconnaissance role in the counterinsurgency effort is of major importance. Extensive use of visual reconnaissance, control of supporting arms, convoy cover, and radio relay is common to counterinsurgency operations.

3705. EVACUATION FROM HOSTILE AREAS

Evacuation of personnel from areas threatened by hostilities will normally require an MAGTF. The landing force should be tasked with providing helicopters for transport of troops and noncombatants and helicopter escort; fixed-wing for flak suppression, air reconnaissance, helicopter escort, and close air support; and ground troops for security of the landing zones. Extensive supporting arms other than air and naval gunfire are not normally required, but logistic support is critical for the entire operation. The MAGTF will be an element of an amphibious task force, task organized especially for air evacuation, and the number of evacuees and degree of hostilities anticipated. Factors to be considered for the evacuation of noncombatants are:

(1) The U.S. Ambassador is the "on scene" commander ashore. He will have authority over the military force involved.

(2) Helicopters are the most likely mode of evacuation. When the helicopter evacuation commences, it will be a last resort action and may trigger apprehension, or even panic, among indigenous personnel as well as U.S. citizens.

(3) There should be reserve helicopter assets available to accommodate a substantial increase over the anticipated number of evacuees.

(4) Locations for helicopter landing zones will probably be in an urban or built-up area. U.S. personnel already ashore should be prepared to eliminate hazards to flight, such as antennaes, tall trees, and utility wires in the vicinity of the pickup areas.

(5) Maps should be available indicating grid coordinates, street names, buildings, and any other landmarks that would assist in navigation and communications.

(6) Helicopter approach and retirement lanes should be over easily recognizable landmarks and terrain features.

(7) If the evacuation is opposed, operations during darkness and periods of restricted visibility will minimize damage or losses from antiaircraft artillery, small arms fire, and missiles.

(8) Planning must include the possibility that hostages may be taken by the opposing forces.

(9) Sufficient aircrews should be available to allow adequate crew rest.

(10) Attack helicopters and fixed-wing aircraft should be available for helicopter escort.

(11) Ships must, if at all possible, operate close to shore to allow minimum transit time for the helicopters.

(12) Planning for adequate command and control should consider:

(a) The use of common terms between all of the armed forces involved and the State Department.

(b) Coordination among helicopters, fixed-wing aircraft, the on-scene commander ashore, the TACC afloat, HDC, MAGTF commander, and the CATF.

(c) The employment of the airborne DASC as a possible solution to communication coordination problems.

(13) Weight limits of helicopters must be predicated upon hovering out of ground effect (HOGE) data to allow vertical ascent and descent in built-up areas.

(14) Movement of evacuees to the helicopter landing zones (HLZ's) will be slow because many may be elderly, pregnant, or otherwise incapacitated. It is probable that a general state of confusion will exist among the evacuees, preventing an organized evacuation.

(15) Lights, noise, traffic, and fires will make approaches, landings, and departures within an urban area confusing and hazardous. The detection of small arms fire and HLZ markings will be difficult for the same reason.

(16) Accommodations must be made aboard ship for the women, children, and injured. Indigenous personnel who may be sympathetic to the hostile forces may be among the evacuees. Accommodations for interrogation and security, therefore, is also a requirement.

(17) A noncombatant evacuation from a hostile area will probably receive worldwide attention. The forces involved must be prepared for extensive news coverage, continuous situation reports (SITREPS) to higher authority, and a policy for courteous and timely response to the many inquiries that will come from outside of the chain of command.

(18) A noncombatant evacuation from a hostile area may develop into a complex, drawn-out, and tense operation and will demand the highest degree of professionalism from all personnel involved.

CHAPTER 4

AIR SUPPORT PLANNING

Section I. INTRODUCTION

4101. GENERAL

The Marine air-ground task force is designed to operate as a landing force or as a component of a larger landing force. Organic air reconnaissance forces within the task force contribute to the execution of the operation as elements of landing force aviation. Specific considerations apply to this aviation element in the planning sequence, which is the subject of this chapter.

4102. PLANNING GUIDANCE

As soon as practicable after the receipt of the initiating directive, the CATF issues a planning directive to ensure that interdependent plans are coordinated, completed according to the time limitations, and comprehensive in their scope. This directive specifies the principal plans to be prepared and the time allotted for this preparation. Then each successive commander; i.e., landing force, ground and aviation, prepares a planning program containing his force planning schedule. This planning guidance, at any level, may be either oral or written and is prepared for and given to subordinate commanders and staffs. It also provides the needed information for concurrent, parallel, and detailed planning for the subordinate unit commanders involved, as well as a framework for the necessary studies and estimates. It serves, for instance, as a guide for the preparation of aviation staff estimates. As soon as the CLF provides his initial planning guidance, the MAGTF aviation commander will issue his guidance to aviation subordinates. Such guidance is updated throughout the planning phase by directives, memoranda, outlines, plans, staff conferences, and informal briefings.

4103. PRELIMINARY PLANNING DIRECTIVES

Preliminary planning directives augment the CATF planning guidance and may, in fact, precede the initiating directive. They are based upon alerting notices received by commanders providing forces for the amphibious task force. Although the format of such alerting notices are too varied to be defined, they will be definitive enough to permit an analysis of the area of operations and an assessment of additional intelligence requirements. Study of beaches, ports, communications networks, existing air facilities, and terrain provides an initial basis for determining the number and types of landing force air elements that can be accommodated and supported within possible landing areas.

4104. SEQUENCE OF AIR STAFF PLANNING

The sequence of planning air support, as it affects the landing force, includes the following steps:

a. Receipt of Initiating Directive.--The initiating directive is an order to the CATF, with copies to the landing force and major component commanders, to conduct an amphibious operation. The initiating directive provides for the establishment of an ATF, the assignment of a mission, and the necessary forces to accomplish the mission.

b. Initial Estimate of Landing Force Air Support Requirements.--Aviation planning commences with the preparation of initial estimates of landing force air support requirements which includes all five functions of Marine aviation. These estimates are prepared as soon as initial information of an operation is received by the CLF. At this time, only the broadest estimates can be made. These initial estimates are usually limited to those which tentatively determine the number and type of participating units, the control agencies necessary, and the logistic support required.

c. Initial Planning Conference.--Subsequent to the receipt of the initiating directive, the CATF conducts an initial planning conference. At this stage, the CATF and the CLF jointly render decisions on issues which concern all of the elements of the ATF, both landing force and naval. The initial estimate of landing force air support requirements assists the CLF in reaching the basic decisions at the initial planning conference. Included in the basic decisions are the selection of landing force objectives, the development of the landing force concept of operations ashore, the selection of helicopter landing zones, and the selection of fixed-wing aircraft landing fields and drop zones.

d. Commander Landing Force's Planning Guidance.--Planning guidance is derived from a consideration of the information contained in the initiating directive, the initial planning conference, and other instructions that may be received. This guidance is the commander's input to his staff and subordinate commanders for preparation or revision of their estimates. The commander's guidance may take a wide variety of forms and includes a variety of information, but will normally outline broad and general courses of action which the commander particularly desires to be initiated. Subsequent planning guidance will be provided to all levels throughout the planning process.

e. Aviation Estimate of Supportability.--The aviation estimate of supportability summarizes significant aspects of the situation as they influence any proposed course of action, analyzes the impact of aviation factors upon the particular situations, then evaluates and determines how aviation units can be best employed in support of each contemplated landing force course of action. The aviation estimate is presented verbally or in writing to the CLF by the landing force aviation element commander.

f. Commander Landing Force's Estimate.--The CLF selects the most favorable course of action in his estimate and announces it as his decision. The commander's decision provides a firm basis for subsequent development of the operation plan and, appropriately amplified, it becomes the commander's concept of operations ashore.

g. Detailed Estimate of Air Support Requirements.--Detailed planning of landing force air support requirements commences after the CLF issues his concept of operations. The detailed estimate of air support requirements establishes the number and type of aircraft in terms of squadrons that will be needed to support the operation. It also provides information concerning the use of nuclear weapons, enemy targets in the beachhead area, enemy targets remote from the beachhead which may affect the force, air reconnaissance necessary to support the operation, assault support operations in and about the landing area, and the control facilities necessary to support the commander's concept of operation. Attention is given to the time required to locate and prepare facilities and/or sites which will assist the aviation component in the early establishment of aviation units ashore.

h. Aviation Concept.--The final step in the aviation staff planning sequence is the preparation of the aviation concept of operations. Additionally, completion of the aviation element task organization requires inclusion of all aviation support units needed for the tactical units specified in the detailed estimate of air support requirements. Air operation plans and orders may now be prepared.

Section II. VISUAL RECONNAISSANCE

4201. GENERAL

Visual reconnaissance missions are normally requested by the ground commander to provide necessary information relative to the overall enemy situation, terrain, and hydrography. The Marine observation squadron (VMO) and the Marine attack helicopter squadron (HMA) are the principal FMF units employed for aerial visual reconnaissance and observation. The Marine air observers are organic to the VMO squadron, however, artillery regiments and field artillery groups also have Marine air observers. The VMO squadron is equipped with the OV-10 aircraft and can normally support the air observation mission; however, the situation, mission, and size of the MAGTF (e.g., a MAU) may dictate that HMA or MHL helicopter squadrons be utilized for visual reconnaissance missions.

4202. PURPOSE

a. The purpose of aerial observation is to provide commanders with information of intelligence value not readily available from normal ground sources; to procure information concerning the enemy, terrain, and hydrography and to supplement operational information of friendly forces; to direct supporting arms for the ground forces to include artillery, naval gunfire, and air; to perform utility and liaison missions as directed from an observation aircraft; and to advise commanders on matters pertaining to aerial observation.

b. The mission of the VMO is to conduct aerial reconnaissance and surveillance, direct supporting arms, and perform utility and liaison missions in support of ground troops.

4203. CAPABILITIES

Visual air reconnaissance is a rapid means of acquiring current information on enemy activities, installations, and terrain. It supplements and extends those reconnaissance and surveillance means which are normally available to the ground commander. When requesting visual reconnaissance, the following capabilities are considered:

a. Visual reconnaissance is an integral part of the overall intelligence collection effort.

b. It may be conducted from high performance aircraft for long range and/or high threat missions and from light observation planes and helicopters as the situation dictates.

c. It provides a trained aerial observer able to devote full time to observation.

d. It provides night visual air reconnaissance, particularly against moving vehicles, but is generally restricted to route and area search.

4204. LIMITATIONS

During the planning stage for air observation missions, limitations also must be considered. The most significant limitation of air observation is the difficulty in providing support at night and in periods of limited visibility. Other significant aircraft and crew limitations include:

a. Crew Fatigue.--With the myriad of tasks assigned to the pilot/AO team during the time of the mission, crew fatigue must be considered. Normally, an aircrew will lose its optimum effectiveness after approximately 2 hours of airborne operations.

b. Time on Station.--The radius of action of an aircraft is contingent upon many factors; i.e., distance from air base to target area, full consumption of fuel in relation to attitude flown, ordnance load, and fuel reserve requirements.

c. Communications.--Radio communications are of great importance to air reconnaissance support. Radio communications are the only means for transmitting detailed instructions to ground forces and other airborne aircraft. Coordination of aircraft support missions with restrictive fire plans and flak suppression requires positive control and reliable radio communications.

d. Weather.--Weather, in addition to being a limiting factor itself, aggravates all other limitations. The weather at the target is the main limitation rather than en route and home base weather. Weather at the target area makes identification and location of the target difficult and limits the types of observation that can be made. With low ceiling and poor visibility, the effectiveness of visual reconnaissance decreases. As ceiling and visibility improve, so does the capability of visual reconnaissance.

e. Enemy Countermeasures.--The advance of highly sophisticated antiaircraft weaponry is a definite deterrent to visual reconnaissance.

4205. TASKS ASSIGNED

The tasks assigned during a normal air observation mission are multiple. The pilot and air observers are trained to provide the necessary information to the ground commander in accordance with Marine Corps Order P3500.8_, Aviation Training and Readiness Manual. Normal tasks assigned to the air observation mission are:

a. Visual Reconnaissance.--Visual reconnaissance is generally described as airborne activity primarily for detection, location, identification, and reporting timely information which will directly support the air-ground task force. The pilot and aerial observer will expend more of their energies and time on visual reconnaissance missions than any of their other responsibilities. Frequently, a pilot/air observer will launch specifically to conduct a visual reconnaissance mission. The pilot and aerial observer must therefore be familiar with the enemy and friendly situation, weather, terrain, and areas where enemy fire has been reported so as to properly plan the conduct of the flight. A thorough brief with the command operations and intelligence section prior to launch will provide this information and greatly enhance the overall intelligence gathering effort.

b. Battlefield Surveillance.--Battlefield surveillance is the continuous (all weather, day and night) systematic watch over the battle area to provide timely information for combat intelligence. Such surveillance includes the reporting of all activity observed. This type of mission is particularly applicable in the early stages of an operation when the situation has not been fully developed.

c. Area Search.--Area search is reconnaissance conducted at intervals over a prescribed area and usually for a specified period of time. This type of reconnaissance is particularly suited to sparsely populated areas and open terrain.

d. Specific Search.--Specific search is reconnaissance of a well-defined locality for evidence of specific activity or conditions. This search is most frequently employed to confirm information derived by other intelligence collection agencies.

e. Route Reconnaissance.--Route reconnaissance is described as visual observation over enemy routes of communication, along planned avenues of approach, or over friendly routes of communication subject to enemy interdiction.

f. Helicopter Landing Zone Reconnaissance.--Helicopter landing zone reconnaissance is visual reconnaissance to determine the location, characteristics, capacity, and suitability of potential HLZ's. Reconnaissance of such locations should be sporadic to prevent disclosure of future intentions.

g. Terrain Analysis.--Visual observation of ground forms, cover, and natural obstacles is conducted to provide ground commanders with information on which to base a concept of operations, devise schemes of maneuver, and develop logistics plans.

h. Map Correction.--Missions of this type are normally conducted to update information displayed on existing maps and aerial photo-mosaics. Effectiveness of such observation is usually enhanced where well-defined localities are specified for comparison of actual terrain features with corresponding features depicted on a map.

i. Damage Assessment.--Air observation missions of this type are usually flown to provide ground commanders with immediate information of the effect of supporting arms fire. The air observer's visual acuity under such circumstances may be hampered by smoke, haze, fire, and debris.

j. Observation of Ship-to-Shore Movement.--During amphibious landings, the pilot/AO team can provide command elements with continuous information of the progress of surface craft and helicopter waves.

k. Handheld Aerial Photography.--The air observers utilize small, lightweight, handheld, aerial cameras, providing the ground commander with a major means of acquiring information of intelligence value. The low-level, pinpoint photography taken by the air observer augments that photography obtained by the high performance aircraft of the Marine tactical reconnaissance squadron.

(1) Types of Photography

(a) Near Verticals.--These photographs are taken with the axis of the camera as near to the vertical as possible. A near vertical photograph must be taken within 5 degrees of the vertical in order to render the desired result. This type of photography is especially useful in pinpoint photography of point targets.

(b) Low Obliques.--Photographs in this category are taken with the camera tilted away from the vertical and do not include the horizon. Such photography is well adapted to the capabilities of handheld aerial photography and particularly useful in detecting activity alongside or immediately within tree lines and heavy growth.

(c) High Obliques.--At least 20 percent of the photograph is horizon in this type of photograph. The panoramic view of a large area (extent of coverage depends on altitude) resulting from high obliques can provide the ground commander with an accurate portrayal of the general nature of the terrain.

(d) Panoramic Strip Photography.--Panoramic strip photography employing the KB-18A camera (AFC 20) can be used in making uncontrolled photo-mosaic maps. Although the KB-18A camera was intended as a strike camera to record aerial delivered sensor release points, when required, it can be successful as a reconnaissance camera. The KB-18A camera is not intended or capable of carrying out the VMFP mission, but can be used under certain conditions to supplement it. For general description and operating procedures of the KB-18A camera, refer to NAVAIR 01-60GCB-1, OV-10A NATOPS Flight Manual.

(2) Typical Photo Missions.--Air observers normally take cameras on all missions in order to respond rapidly to photo requests received while airborne and to record on panchromatic film photographic targets of opportunity. Typical photo missions include, but are not limited to, the following:

(a) Pinpoint Photography.--Requests for missions of this nature are normally generated by a need for the ground commander to determine the characteristics of, or activity at, a specific locality; e.g., bridges.

(b) Beach Photography.--This type of mission normally requires vertical and oblique photography, covers the surf line to immediate hinterland, and includes terrain which provides direct observation of the beaches. Beach photography provided by the VMO is supplemental to that obtained by the Marine tactical reconnaissance squadron early in the planning phase of amphibious operations.

(c) Helicopter Landing Zone Photography.--Pinpoint and oblique photography of potential HLZ's is usually taken during such missions. Air observer photography of HLZ's is often used to update photo coverage obtained by the VMFP.

(d) Terrain Analysis Photography.--Missions of this type are normally conducted to provide the ground commander with up-to-date photography of critical terrain directly affecting the accomplishment of his mission.

(e) Route Photography.--Route photo missions are conducted to provide the ground commander with a rapid means of determining the general condition of roads, trails, and waterways. During such missions, the air observer photographs specifically requested routes including activity and terrain features which best portray the trafficability or navigability of the route.

(f) Damage Assessment Photography.--Photo missions to determine the extent of combat or natural damage of geographical areas and works of man normally require low-level, vertical, and oblique photography. Immediate damage assessment photography of areas subjected to supporting arms fire can provide ground commanders with an accurate indication of the effectiveness of supporting arms fires.

(g) Utility Photography.--Missions in this category include administrative photography of friendly installations to record relative locations, access to lines of communication (LOC's), and camouflage effectiveness; map correction photography to assist in the updating of pertinent maps; and photography to assist commanders in visualizing troop dispositions across selected terrain.

l. Supporting Arms.--The pilot/AO team provides the ground commander with a unique means of adjusting the fires of supporting artillery and naval gunfire and control of close air support. Trained to conduct fire and strike missions and in direct communication with the supported unit, the pilot and air observer can bring fires to bear on targets not visible or suitable for adjustment by ground observers.

(1) Artillery Adjustment.--Adjustment of artillery fire by the pilot or air observer allows the engagement of targets which may be beyond the range of vision of the artillery battery or forward observer. During adjustment and subsequent conduct of fire, the air observer communicates directly with the fire direction center (FDC) of the artillery battalion or firing battery as appropriate.

(2) Naval Gunfire Adjustment.--Adjustment of the fires of naval gunfire support ships by the pilot/AO team allows the engagement of targets which may be beyond the range of vision of the ships or of shore fire control parties (SFCP's). The air observer communicates directly with the fire support ship and with the FSCC of the supported infantry battalion, as required.

(3) Control of Strike Aircraft.--Under certain conditions, the pilot or air observer can effectively control close air support strikes by acting as airborne forward air controller. The pilot/AO team working together maintain direct communications with the supported ground troops and supporting strike aircraft at the same time. They have the ability to closely identify, accurately mark, and control the strike aircraft on the target. At the conclusion of the airstrike, they will conduct an immediate bomb damage assessment.

m. Utility Missions.--Additionally, the pilot/AO team is capable of performing many and varied utility missions in support of ground forces. Included among such missions are:

(1) Convoy Control.--Increased security and control for motor and track vehicle convoys along roads and amphibious craft on waterways can be obtained through the use of air observers in direct communications with the command and control elements of the convoys. In particular, ambushes, chokepoints, and obstacles to the convoy's progress can often be detected by air observers in time to allow appropriate action by the convoy commander.

(2) Radio Relay.--An obvious, but often overlooked, air observer capability is that of radio relay for units separated by masking terrain or distances beyond the range of ground radios. Figure 8 illustrates the potential advantage which can be derived by units employing air observers as relay stations.

Radio	Normal Range Between Ground Stations of Compatible Radios	Distance Between Stations With AO Relaying At 5,000 Feet
VHF-FM	10 Miles *	50 Miles
UHF	20 Miles *	80 Miles
HF	55 Miles	3,000 Miles

* Line of sight

Figure 8.--Radio Relay Capabilities.

(3) Sensor Delivery and Monitoring.--The OV-10 is presently capable of delivering two general classifications of sensors: seismic and acoustic. Seismic sensors (ADSIDS) are usually employed in a string of two to four with approximately 200 meters between individual sensors and placed within their optimum sensitivity distance from a road or trail. When employing the OV-10 to deliver sensors, a second OV-10 in trail, equipped with the KB-18A camera, must be utilized to record aerial delivered sensors. For the monitoring mission, air observers utilizing the USQ-46 PORTATALE should be monitoring for activation of the sensor codes being dropped. For operating procedures, see NAVAIR 01-60GCB-1T, OV-10A Tactical Manual.

(4) Paraflare Drop.--Illumination of a target with flares is a challenging and demanding mission often performed by the OV-10 and the AH-1. Flare employment can be utilized for night search and attack, troop insertion by helicopter, and control of supporting arms. This utility mission may be performed by VMO or HMA type squadrons. For paraflare drop procedures, see NAVAIR 01-60CGB-1T.

(5) Visual Ground and Aerial Reconnaissance and Surveillance.--The combination of a reconnaissance helicopter with an air observer, and a helicopter-lifted reconnaissance team, or OV-10 aircraft, with an air observer and paradrop reconnaissance team is an example of an integrated effort. The air observer conducts aerial reconnaissance or maintains surveillance of a designated area, specific locality, or route. Should he observe an unidentified object or activity, or find that a portion of the area is too well concealed to accomplish his mission, the reconnaissance team embarked in a helicopter can land or the team embarked in the OV-10 can parachute nearby and conduct a ground reconnaissance of the object, activity, or area.

4206. ASSETS AVAILABLE

The concept of employment for Fleet Marine Forces envisions the formation of a Marine air-ground task force specifically tailored to meet the anticipated situation surrounding the assigned mission. Marine air observation assets are found within air-ground task forces as an organic air support means. These air assets include the TA-4, OV-10, UH-1, and AH-1.

4207. TACTICAL EMPLOYMENT CONSIDERATIONS

The commander's estimate of the situation relative to the tactical employment of visual reconnaissance and observation of the MAGTF includes but is not limited to:

a. Mission of the air-ground task force.

b. Concept of operations.

c. Characteristics of the objective areas in the FBHA.

d. Size and composition of landing force.

e. Planned supporting arms requirements for pre-D-day, D-day, and post-D-day operations.

f. Type, composition, and organization of enemy forces.

g. Duration of anticipated landing force operations.

h. Aircraft, pilot, and air observer availability to the landing force. If possible, pilots and air observers should be 100 percent fully combat qualified, in accordance with Marine Corps Order P3500.8_, Aviation Training and Readiness Manual.

i. Logistics support.

j. Communications.

k. Terrain.

l. Enemy air defense capabilities.

m. Reserve forces available.

4208. AIR SUPPORT REQUIREMENTS

The three types of Marine air-ground task forces are normally task organized commensurate with the mission. Normally, only helicopter aviation capabilities are included in the aviation combat element of the MAU, although special situations may dictate inclusion of V/STOL and fixed-wing observation aircraft. Both fixed-wing and helicopter aviation assets are included in the aviation combat elements of the MAB and the MAF.

a. MAU Air Observation Assets.--Whenever the MAU is deployed, the aviation combat element normally consists of two or more types of helicopters. In this situation, Marine air observers are task organized to the composite squadron and utilize the UH-1 or the AH-1 for air observation missions. The MAU commander must dedicate aircraft for air observation missions. Aerial observation, understandably, is an integral part of any successful air-ground operation.

b. MAB Air Observation Assets.--When the MAB is the deployed element, normally the aviation combat element consists of a Marine air group. The MAG consists of both fixed-wing and helicopter aircraft with antiair warfare capabilities available as dictated by type mission. Unlike the MAU, the aviation combat element of the MAB is organized and equipped to be capable of early establishment ashore as existing airfields and expeditionary facilities in the FBHA become available. A VMO detachment consisting of OV-10 aircraft is normally attached to the MAG. It is envisioned the OV-10 would be introduced into the objective area for an amphibious operation via either flight ferry or DVA, LHA, or LPH shipping. However, in that the aircraft is not certified for shipboard operations, the use of such shipping would be limited to a transport role. After the establishment of a STOL aircraft support facility ashore, the OV-10 would be deck-launched or flight ferried for recovery and subsequent operations ashore. Ideally, this facility will be established ashore on D-day and provide OV-10 support on D+1.

c. MAF Air Observation Assets.--When the MAF is the forward deployed element, normally the aviation combat element is a Marine aircraft wing; however, the aviation combat element can range in size from one to several aircraft wings. The aviation combat element is organized and equipped to facilitate its early establishment and operations ashore in amphibious operations. While the VMO is organic to the Marine aircraft wing, it normally must operate from an adjacent area during the attack phase of the amphibious operation. Until such time as airfields and expeditionary facilities are established ashore, air observation missions must be flown from other fixed-wing aircraft; i.e., TA-4, or the UH-1 and AH-1 helicopters.

4209. REQUEST PROCEDURES

The provision of timely and effective air observation/surveillance support is in large measure determined by the proper preparation and prompt submission of requests. The request format (see app. C) is concise, self-explanatory, and designed for submission in written form or transmission by electronic means.

a. In garrison, request for air observation support must go to the air officer at the highest echelon of command of ground forces who subsequently will request the support from the Marine aircraft wing.

b. During the course of training exercises and operational deployments, air observation assets will be organic to the MAGTF and can be requested on a day-to-day basis.

c. During the time ground forces are deployed in the field, requests for immediate air observation support are requested over the tactical air request (TAR) net to the DASC. Air observers will be assigned to units by the DASC on a priority basis contingent upon the tactical situation.

4210. DISSEMINATION

Air reconnaissance, an integral part of the Navy-Marine Corps multipurpose collection system, provides information only. Intelligence must be extracted from this raw data, combined with information from other intelligence sources, and disseminated to all units, both ground and air. The pilot/AO team, with the availability of the HF/UHF/VHF-FM radios, is normally in a position to be in direct contact with both air and ground elements and can disseminate information to supported units in an immediate time frame. For detailed information concerning communications, see chapter 5 and FMFM 10-1, Communications.

4211. REPORTS

Samples of report forms are included in appendix D. They provide commanders with the basic information required to conduct a mission and provide examples of the type of information which can be obtained for the ground unit. Samples of the report forms included are listed below.

a. Request for Air Observation Support.

b. Helicopter Landing Area Reconnaissance Report.

c. Urban Reconnaissance Report.

d. Road Reconnaissance Report.

e. Bridge Reconnaissance Report.

f. Culvert Reconnaissance Report.

g. Railroad Reconnaissance Report.

h. SALUTE Report Format.

Section III. MULTISENSOR IMAGERY

4301. GENERAL

The ability to conduct successful multisensor imagery is essential to the execution of an amphibious operation. For that reason, the Marine tactical reconnaissance squadron (VMFP) has been established.

4302. MISSION

The mission of the Marine tactical reconnaissance squadron is to conduct aerial multisensor imagery reconnaissance to include aerial photography, infrared, and side-looking airborne radar reconnaissance in support of the FMF.

4303. CAPABILITIES

The capabilities of the Marine tactical reconnaissance squadron are:

a. To conduct multisensor imagery both day and night.

b. To operate during instrument flight conditions.

c. To deploy detachments aboard aircraft carriers, advanced bases, and short airfields for tactical support.

d. To conduct long-range operations utilizing aerial refueling.

e. To process and reproduce aerial multisensor imagery obtained by organic aircraft.

4304. LIMITATIONS

It is imperative that limitations also be considered when considering the method of gathering reconnaissance.

a. Weather.--Weather has a large effect on the success of the photo reconnaissance mission. It affects the employment of sensors, range of aircraft, and ability to find targets.

b. Enemy Defenses.--Enemy defenses affect range, and introduce risk factors which must be considered when planning air reconnaissance missions. Antiaircraft artillery, surface-to-air missiles (SAM's), enemy fighters, and small arms fire are defenses to be considered when evaluating the risk and considering routes.

c. Range.--Range can be a limiting factor on the accomplishment of the photo reconnaissance mission. Considerations are locations of enemy defenses, projected air refueling support, and weather in the AOA.

d. Terrain.--Terrain affects communications, the ability to find targets, and evasion of enemy defenses.

e. Timeliness.--Multisensor imagery must be processed and interpreted prior to dissemination. Therefore, there is a time lag between the time the information is gathered and when the intelligence is received by the requesting unit.

f. Time of Day.--In order to obtain optimum imagery, it is desirable that it be collected at certain times of day to allow for optimum shadow effects and radiation patterns.

4305. TASKS ASSIGNED

a. The Marine tactical reconnaissance squadron can supply imagery for:

(1) Beach analyses.

(2) Detection of enemy movements.

(3) Detection of enemy assets:

(a) Offensive.

(b) Defensive.

(4) Topographical analyses:

(a) Bridges.

(b) Chokepoints.

(c) Primary and secondary routes.

(d) Inland waterways.

(e) Terrain analyses.

(5) Planning of avenues of approach:

(a) Helicopter approach and retirement routes.

(b) Landing zone analyses.

(c) Loft aerial bombing approach and retirement routes.

(6) Prestrike briefings and orientation.

(7) Bomb damage assessment.

b. See section 5 of this chapter for details of photo interpretation of the above listed imagery. In supplying the imagery as listed in paragraphs 4305a(1) through (7), the following systems are utilized:

(1) Photographic.--There are three distinct types of aerial photography: vertical, oblique, and panoramic.

(a) Vertical Photography.--Vertical photography, the most commonly used for interpretation in the military, is taken with the optical axis of the camera perpendicular to the surface of the earth. This results in a scale that is basically constant throughout the photo unless there is a wide variation in elevation of the area covered by the photo. Because of the relatively constant scale, vertical photography is used for interpretation when precise measurements are required. The following specific types of vertical photography are obtainable for Marine Corps use:

1 Vertical Strip.--Vertical strip photography consists of a single flight line of overlapping photos. Photography of this type is normally taken of long, narrow targets, such as beaches, roads, or helicopter approach and retirement lanes.

2 Split Vertical.--Split vertical photography consists of two photographs taken by the simultaneous exposure of two cameras mounted at slight angles to the vertical. One camera is tilted to the left and one camera is tilted to the right which results in strips with a small amount of sidelap. (See fig. 9.) These near vertical photos will suffice for any purpose not requiring precise measurements. This type coverage is utilized when the area to be photographed is too wide for coverage by a single vertical strip and repeated flights over the area are not advisable.

3 Pinpoint.--Pinpoint photography consists of single photograph, vertical or oblique, of a predetermined point used to obtain significant information of a small area or object. Common targets for pinpoint coverage are specific buildings, airfields, road/railroad intersections, bridges, etc. (See fig. 10.)

4 Night Photography.--Night photography is flown only as vertical strip or vertical pinpoint photography utilizing illuminants. This type of photography is normally used in detecting troop and supply movements or other enemy activity likely to occur during hours of darkness. Available illuminants limit the altitude of the aircraft to a maximum of 8,500 feet, thus restricting the scale available. Target location is extremely difficult at night. Any assistance that can be rendered by other units such as target marking by mortars and or tracer fire; or target directing by FAC teams or air support radar teams (ASRT's) will improve the likelihood of completing the mission successfully. (See fig. 11.)

(b) Oblique Photography.--Oblique photography is obtained by intentionally tilting the axis of the camera away from the vertical. These photographs are of two types: high and low obliques. The high oblique includes a portion of the horizon, while the low oblique does not. Oblique photography may reveal camouflaged objects which are not apparent on vertical photography because it offers a look at the area from the side. Oblique photography does not require that the photo aircraft fly directly over the target in order to obtain the required coverage. This reduces the possibility of aircraft loss due to ground fire. However, the scale of this type photography decreases progressively from the foreground to the background and makes precise measurements difficult. The most common types of oblique photography are:

1 Oblique Strip.--Oblique strip is the same as vertical strip, except that oblique photographs are used.

2 Pinpoint.--Pinpoint is defined in paragraph 4305b(1)(a)3.

3 Forward Oblique.--Forward oblique photography consists of high oblique photos taken in a single flight line dead ahead of

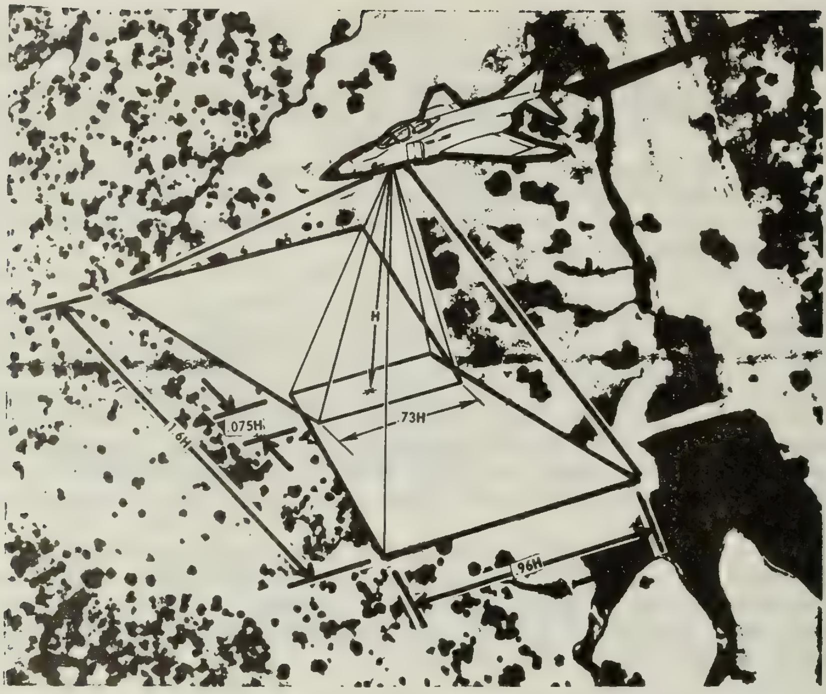


Figure 9.--KS-87 Cameras, Split Vertical, 6-Inch Focal Length, 71.6-Degree Depression Angle.

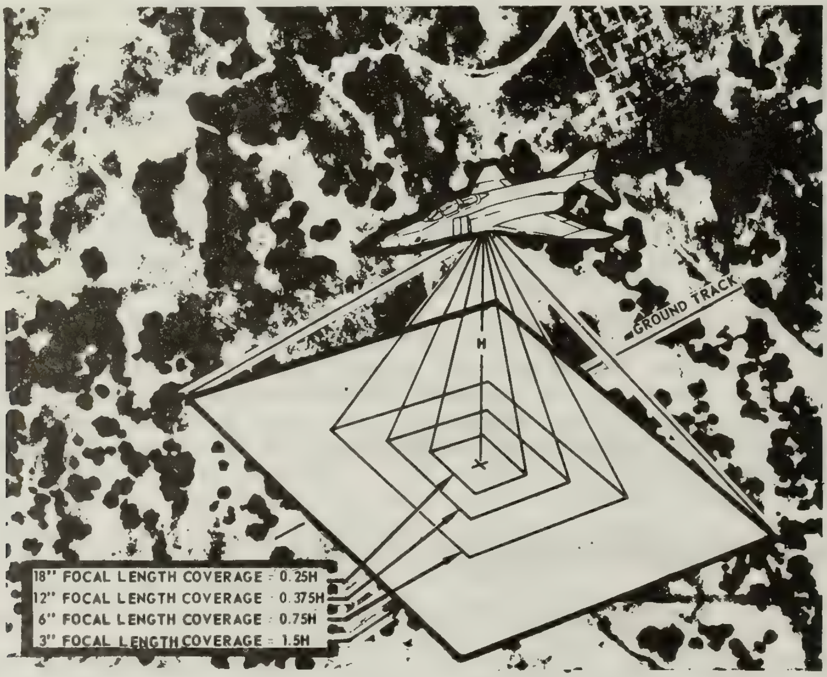

H
GROUND TRACK
18" FOCAL LENGTH COVERAGE = 0.25H
12" FOCAL LENGTH COVERAGE · 0.375H
6" FOCAL LENGTH COVERAGE : 0.75H
3" FOCAL LENGTH COVERAGE = 1.5H

Figure 10.--KS-87 Camera, Vertical Configuration, 18-, 12-, 6-, and 3-Inch Focal Length.

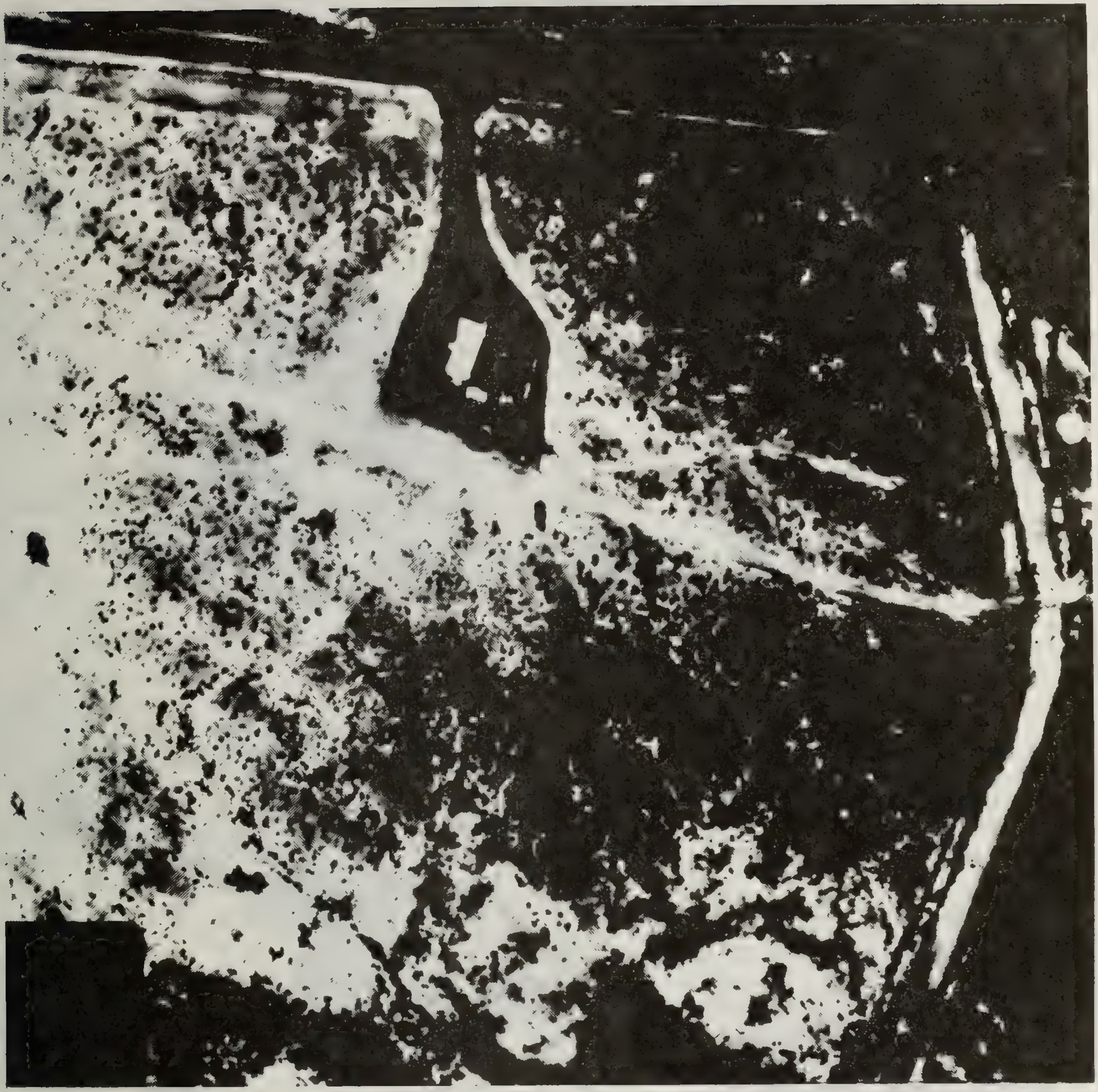


Figure 11.--Night Photography.

the aircraft. This type of photography dmay be used for single point coverage, but normally is used for beach and road reconnaissance, special weapons delivery routes, and helicopter approach and retirement lanes. Forward oblique photography may be obtained at extremely low altitudes and at high speeds making it ideal for use in hostile areas. (See fig. 12.)

4 Area Coverage.--Area coverage consists of two or more flight lines of overlapping photos. Photography of this type is normally used to obtain basic coverage of the entire objective area or selected

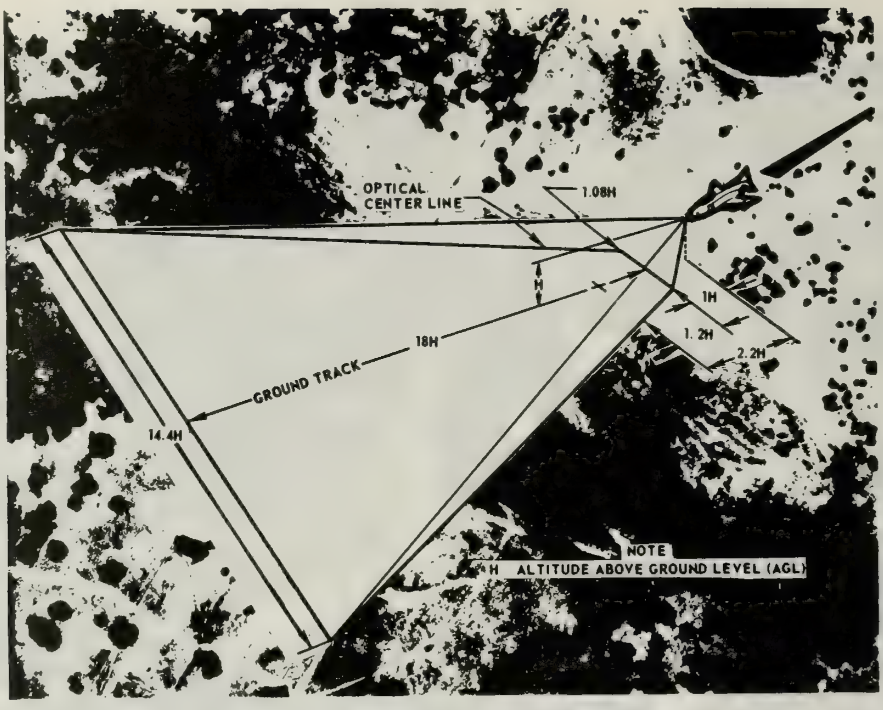


Figure 12.--KS-87 Camera, Forward Oblique, 6-Inch Focal Length, 23.5-Degree Depression Angle.

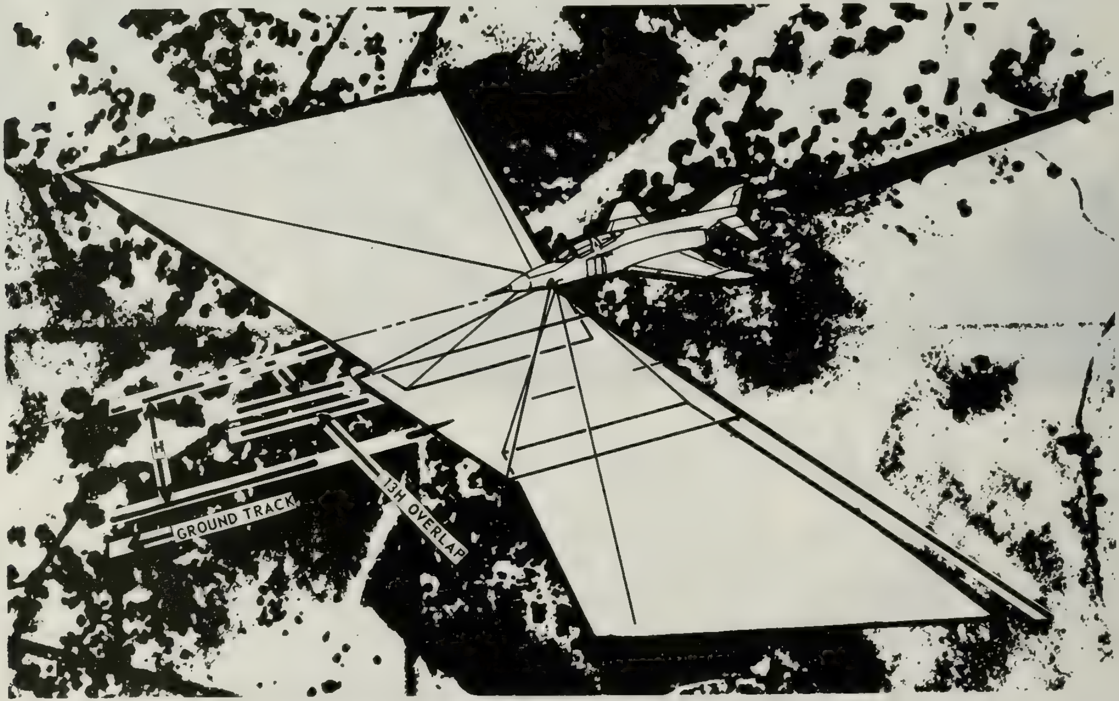


Figure 13.--KS-87 Cameras, Tri-Met Configuration, 3-Inch Focal Length Vertical, 6-Inch Obliques at 37.6-Degree Depression Angle.

areas within the objective area. It does not, however, produce mosaic quality imagery. Mosaic imagery requires stabilized mounts and processing equipment beyond the resources of VMFP-3. Acceptable photos can sometimes be obtained for use in constructing uncontrolled mosaics if the area to be covered is not too large and is reasonably flat.

(c) Panoramic Photography.--Panoramic photography is usually produced by single camera systems utilizing wide angle or prismatic lenses. It allows large area coverage with a minimum number of passes over the target.

1 Trimetrogon photography is obtained by the simultaneous exposure of three different cameras. One camera is set at the vertical with a second camera tilted to the left and a third camera tilted to the right. Originally a means of obtaining horizon-to-horizon coverage, this type of photography has largely been replaced by single, wide angle, prismatic lens camera systems. (See fig. 13.)

2 Low altitude panoramic photography usually covers 180 degrees laterally. The system is redundant for other camera systems and is used primarily for orientation. (See fig. 14.)

3 Medium altitude panoramic photography covers a large area laterally and offers the best area coverage in high threat areas. (See fig. 15.)

(2) Infrared System.--Infrared sensors detect infrared (thermal) energy constantly emitted by manmade and natural objects on the earth's surface. The system converts the different energy levels emitted by each object to a black and white image much like that of a black and white photograph. Infrared is valuable in detecting camouflaged objects and in collecting information at night. However, its effectiveness is reduced by clouds, fog, and precipitation. Information obtained should be corroborated by other means. This device is passive and, therefore, not vulnerable to countermeasures, but it is susceptible to enemy deception.

(3) Side-Looking Airborne Radar System

(a) Side-looking airborne radar, frequently referred to as SLAR, offers the advantage of day or night operation, and it can provide acceptable imagery during conditions of all but the most adverse weather conditions. Additionally, it has a high acquisition rate, provides a target standoff capability, and can detect moving targets.

(b) The disadvantages of the system are that it provides much poorer resolution than photography and is susceptible to electronic countermeasures and electronic noise.

(c) Information obtained needs to be supplemented by other means, such as visual observation and photography, which can better determine the exact nature of the activity detected by SLAR.

4306. ASSETS AVAILABLE

a. Aircraft.--The RF-4 aircraft is a two-place (tandem) supersonic, carrier based, twin turbojet tactical reconnaissance airplane, built by McDonnel Douglas Corporation. The aircraft is designed for all-weather,

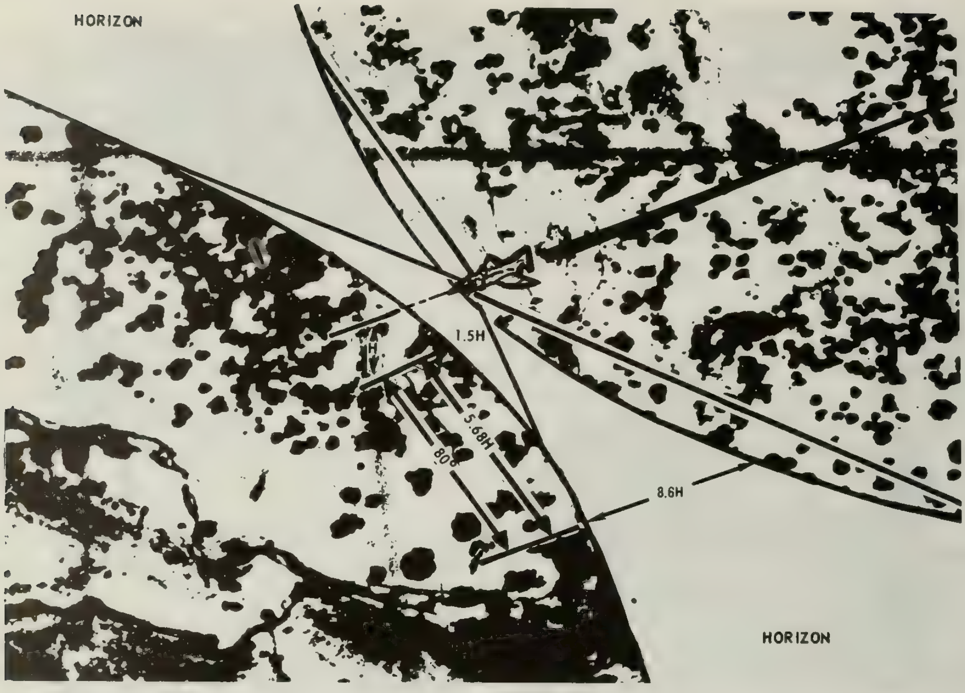


Figure 14.--KA-56 Low Altitude Panoramic Camera,
3-Inch Focal Length, 180-Degree Scan.

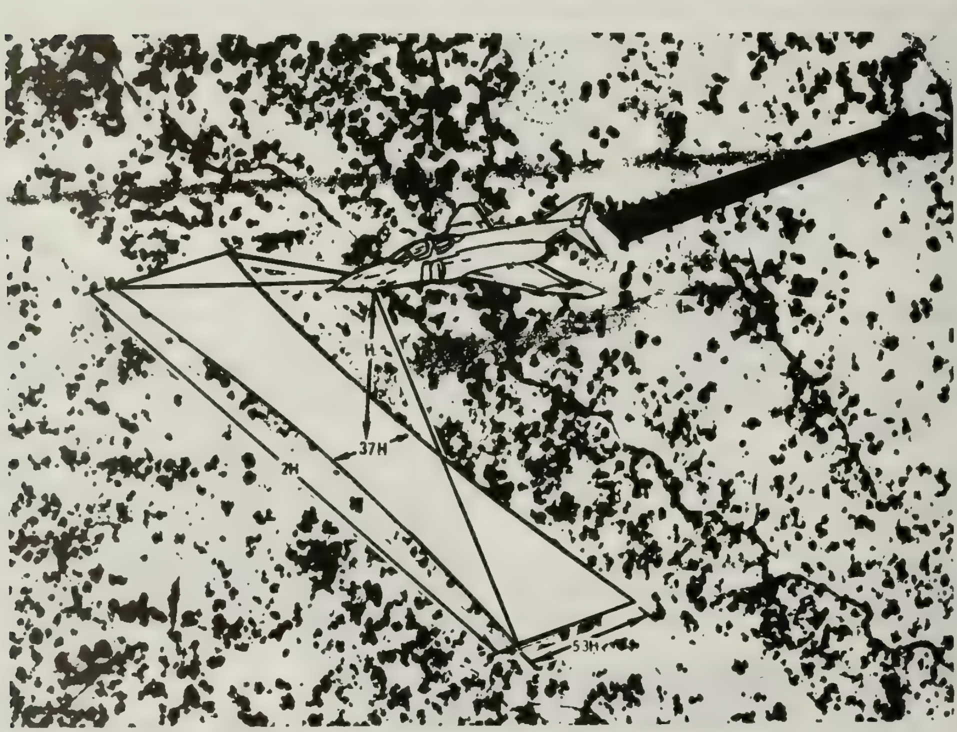


Figure 15.--KA-55 High Altitude Panoramic Camera,
12-Inch Focal Length, 90-Degree Scan.

high-low, day-night selective reconnaissance operations. It is powered by two single rotor, axial flow, variable stator turbo-jet J79-GE-8 engines with afterburner.

b. Systems

(1) Photographic

(a) The KS-87 camera is the most versatile camera installed in the RF-4. It is capable of high and low, day and night, high speed photography. The operating altitude ranges from 250 feet to above 50,000 feet. The film magazine capacity is 500 feet; negative format is 4½ inches square. The KS-87 can be equipped with either 3-, 6-, 12-, or 18-inch focal length lens cones for day photo and with a 3- or 6-inch lens for night photo. The system can be programmed for either 12-percent or 56-percent forward overlap and can be mounted in several different stations. The KS-87 camera can be mounted for vertical photography in the day or night mode with a 3- or 6-inch lens in station one, a 6- or 18-inch lens in station two (day mode only), and a 6-, 12-, or 18-inch lens in station three (day mode only). In station one, the camera is rotatable to either vertical or forward oblique (23.5-degree depression angle). Through the use of a rotatable mount in station two, side oblique depression angles of 5 degrees, 15 degrees, 30 degrees, or vertical can be obtained with the 18-inch lens. A 6-inch lens may also be mounted in station two at a fixed depression angle of 37.5 degrees. Figure 11 is an example of night optical photography taken by the KS-87 camera between 1,000 and 2,000 feet using a 6-inch lens. To provide a light source for this photography, the RF-4 is equipped with photoflash cartridge ejector racks located on either side of the fuselage. Either of two types of cartridges may be utilized. The M112 produces 110 million candlepower and is used for target illumination between 500 and 4,000 feet. The larger M123 produces 260 million candlepower and is used for altitudes up to 8,500 feet. Only the 3- and 6-inch lens cones are equipped with the intra-lens shutter required for photoflash, thus limiting the scales available.

(b) The KA-56 is a low altitude panoramic camera which scans 180 degrees, including both horizons. Film format is 4½ by 9½ inches. The focal length of 3 inches limits its use primarily to low altitude. The rapid cyclic rate (up to six frames per second) permits high speed reconnaissance. Due to the characteristics of the system, scale factor and image quality deteriorate rapidly past approximately 30 degrees from nadir. The KA-56 system is designed for day visual flight condition only. The photograph and map pictured in figure 16 depicts the coverage of the KA-56 low altitude panoramic camera. Note that the coverage projected on the map is in the form of a "bowtie" oriented perpendicular to the aircraft flight path. This effect is caused by the changing target distance from the lens resulting in the scale at the sides of the picture being distorted from that directly beneath the aircraft. This type of presentation can be highly effective to determine if lines of transportation are being used or in other instances when precise scale is not a factor.

(c) The KA-82 is a medium altitude, panoramic camera which scans 140 degrees laterally (± 70 degrees of vertical). The longitudinal angle of view is approximately 21 degrees; the film format is 4.5 inches by 29.3 inches; film capacity is 2,000 feet. The 12-inch focal length of this camera, wide area of coverage, and excellent image quality have made it a favorite of interpreters. It is particularly useful in high threat areas,

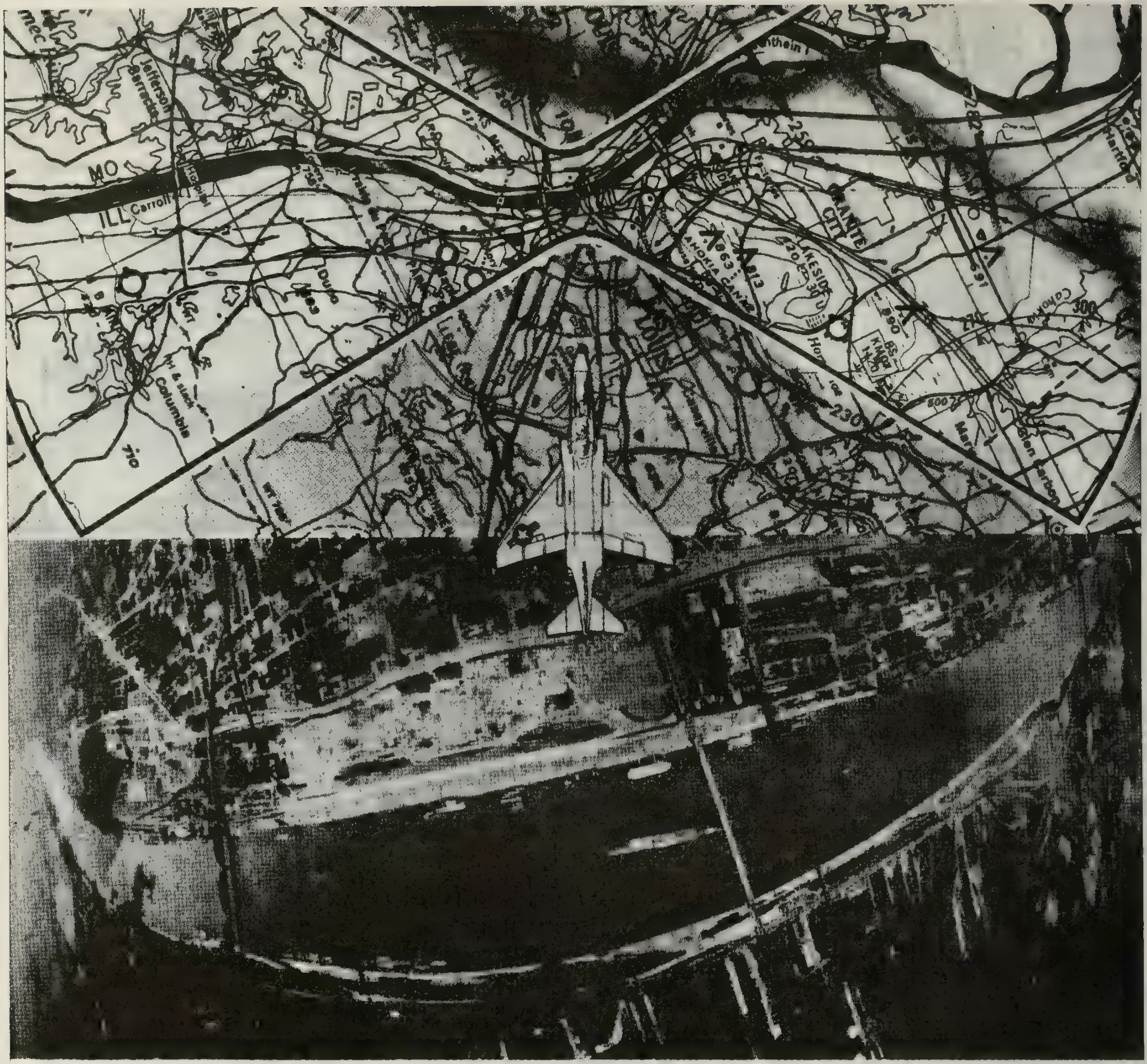


Figure 16.--KA-56 Low Altitude Panoramic Camera.

as the wide area of coverage minimizes the number of runs required. Figure 17 illustrates the coverage of the KA-82 camera.

(d) The selection of film to be used for an aerial photographic mission will depend upon the results that can be obtained through interpretation. The four most common types of film are discussed in the following subparagraphs:

1 Panchromatic.--Black and white film satisfies the majority of the user's requirements and is the most commonly used. It can be obtained at varying film speeds, has a wide latitude in its use, and can be used under varying light conditions.

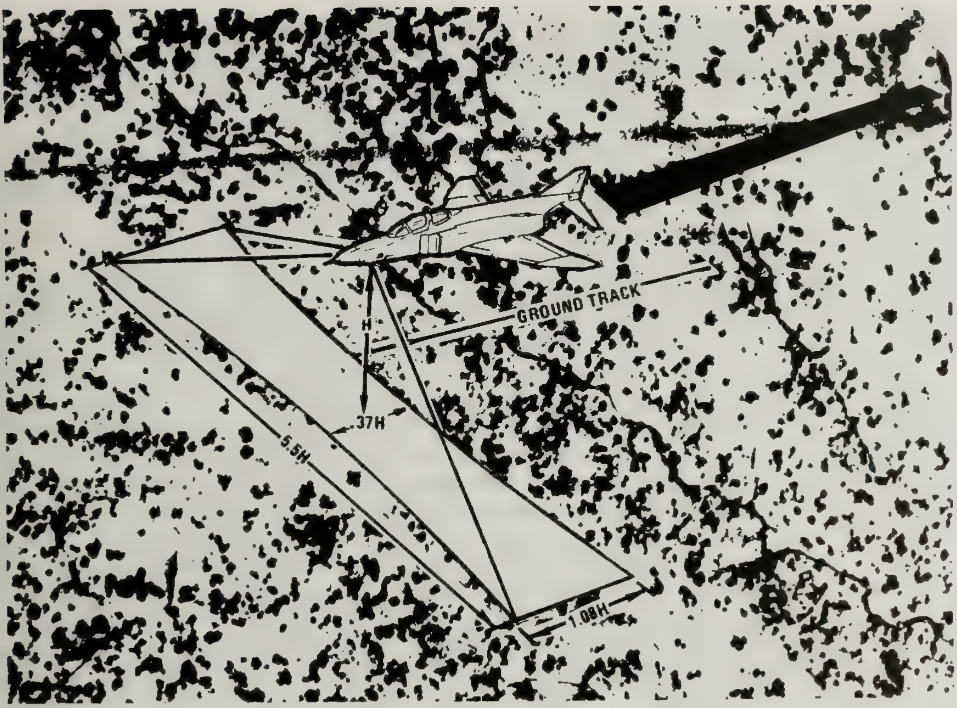


Figure 17.--KA-82 Medium Altitude Panoramic Camera, 12-Inch Focal Length, 140-Degree Scan.

2 Ektachrome.--Color film reproduces full colors within the visible spectrum. It is normally utilized when knowledge of the actual color of an object is of importance to the requester. Color film can also be used to penetrate clear water to limited depths, and is useful in detecting underwater obstacles. There are a few limitations which make the use of color film impracticable for extended operations. Acceptable exposures can be made only during clear weather and during hours of maximum daylight. Color film produces a positive transparency which can be reproduced by a time-consuming process that requires rigid control. The film itself presents a problem in storage because of its sensitivity to temperature change.

3 Infrared.--There are three types of infrared film: infrared (optical), infrared (thermal), and camouflage detection (CDIR).

a Infrared (Optical).--Infrared (optical) film is black and white film used in a conventional camera system that has been chemically treated to be extra sensitive to reflected electromagnetic energy at the longer (red) wave lengths of the visible spectrum and the near infrared spectrum. This film is only effective during sunlight hours and above 65 degrees Fahrenheit. The gray tones on infrared film result from the degree of infrared reflectiveness of the object and not from its color. The unusual effects presented by the varying infrared reflectivity of different objects are of considerable value in photographic interpretation. Live vegetation, with the exception of the coniferous types, registers a light tone which contrasts sharply with the dark appearance of noninfrared reflective objects such as water and many cultural objects. The dark rendition of water is useful in determining the extent of river tributaries, tide lines, swamps, shorelines, etc. Infrared film may be used advantageously in conjunction with ordinary black and white film when covering a camouflaged area.

b Infrared (IR) (Thermal).--Infrared (thermal) film is black and white film (instrumentation) used in the infrared reconnaissance sensor to record infrared radiation. The IR sensor employs a combination of optics, electronics, and mechanical devices to produce the image. This film can be used effectively both day and night to produce continuous strip imagery of the thermal patterns of terrain and targets. This imagery is normally produced at a smaller scale than optical IR and is very useful for map and area updates.

c Camouflage Detection.--Camouflage detection film is very useful in detecting installations or objects which have been camouflaged by vegetation or by infrared absorbing green paint used to represent vegetation. Camouflage detection film is difficult to process and reproduce, therefore it should be used in conjunction with black and white film.

(2) AN/AAS-18 Infrared Detector.--The RF-4B is equipped with the AAS-18 infrared detecting set. This system produces a high resolution, continuous strip, film map of the terrain beneath the aircraft by comparing differences in infrared radiation emitted by ground targets. Minimum altitude for satisfactory IR operation is 500 feet. The system may be used day or night. (See fig. 18.)

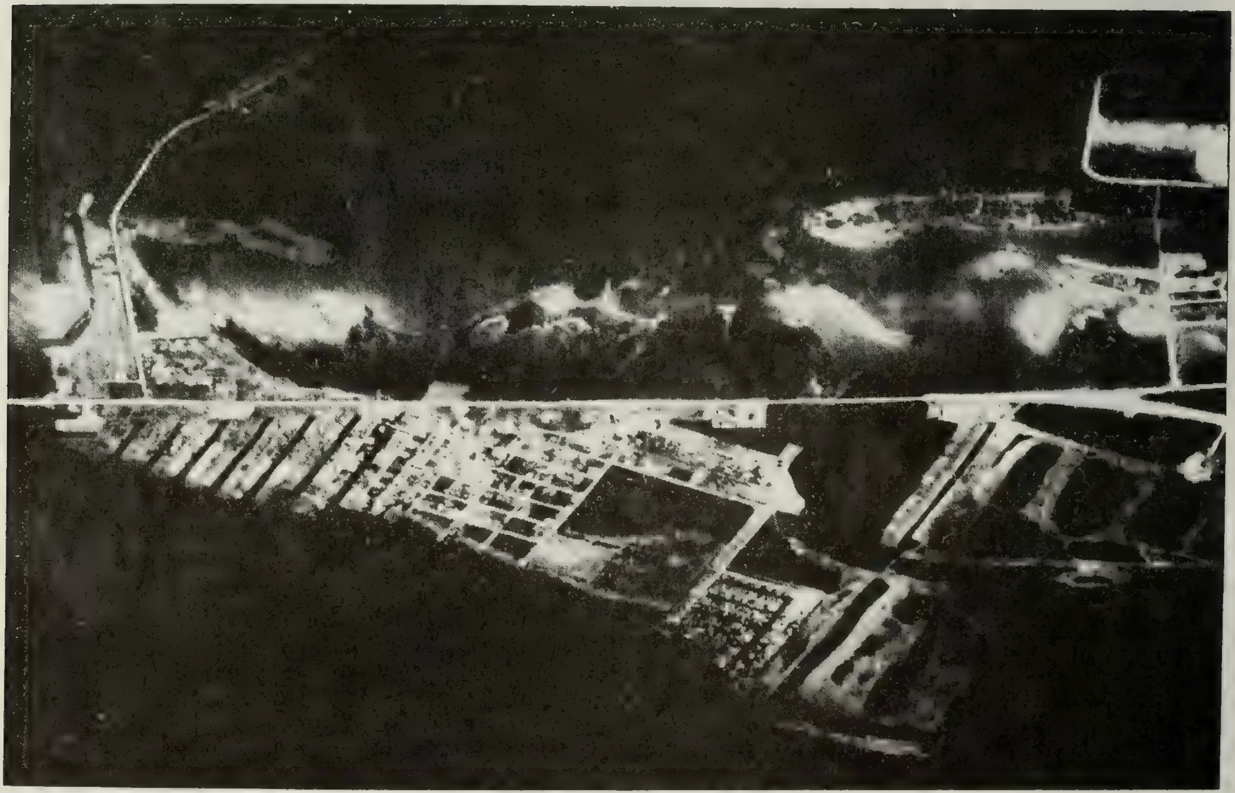


Figure 18.--AN/AAS-18 Infrared Detector.

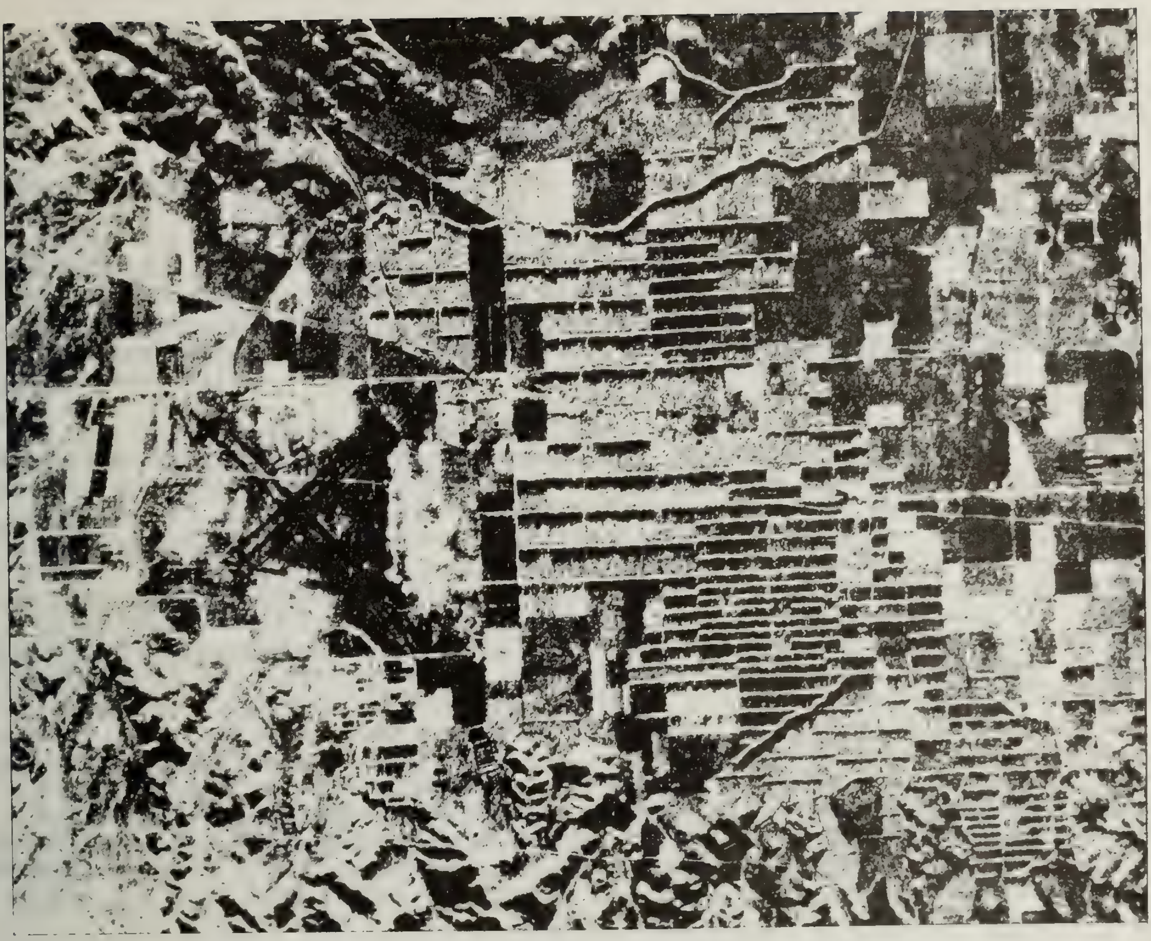


Figure 19.--APQ-102 Side-Looking Airborne Radar.

(3) APQ-102 Side-Looking Airborne Radar.--The APQ-102 SLAR is designed to produce either/or both high resolution (HR) or moving target indicator (MTI) radar reconnaissance maps of the terrain on either or both sides of the flight path. The MTI mode gives indications of any target with a velocity vector in excess of 5 knots perpendicular to the flight path of the aircraft. Highest probability of target detection is when the target track is perpendicular to the aircraft track. The system produces an HR and/or MTI radar map with resolution of 50 feet at a constant scale of 1:400,000. (See fig. 19.)

(4) Communications/Navigation.--The RF-4 communication system consists of a UHF (225-400 MHz) receiver-transmitter and an HF (2 to 29.999 MHz) receiver-transmitter with three modes of operation (upper sideband, lower sideband, and amplitude modulation). The navigation systems include a forward-looking radar for terrain navigation and an inverted navigation system. Additionally, it contains a radar beacon system which can be used with ASRT radars to assist in control of the aircraft for navigation in low visibility weather and at night.

4307. TACTICAL EMPLOYMENT CONSIDERATIONS

The commander landing force must consider a number of factors when planning for the use of multisensor imagery reconnaissance.

a. The number of aircraft required to perform the required reconnaissance is a function of the amount of imagery desired.

b. The number of maintenance and administrative personnel required to support the operation of the aircraft is a direct function of the number of aircraft required and the complexity of the mission; e.g., if SLAR is a requirement for mission accomplishment, then the appropriate personnel who can maintain that system must be deployed to the base where the required maintenance will be done.

c. It must be understood that photo intelligence is not instantaneous. Time is expended in unloading film from the aircraft after it has returned from taking photographs and in processing the film. After processing is complete, the photo interpreter (PI) extracts intelligence from the film, and the intelligence is then disseminated to the requester. It is not uncommon to have 1,000 feet of film to develop following the return of the aircraft to its base. Processing alone takes in excess of an hour with even the most modern equipment. Dissemination after interpretation commonly accounts for the longest delay between the squadron's receipt of a request and the arrival of desired intelligence information to the requester. It is the responsibility of the commander landing force to ensure the delivery of intelligence information following its interpretation. Additionally, it should be a rare case where a requester requires prints of photographic imagery. Requesters are usually untrained in photo interpretation, and a staff of highly competent personnel is collocated with VMFP. Should prints be justified, the time required to process them is variable with the number of frames to be copied, the number of copies of each frame, and the annotation requirements stated by the requester.

d. The total logistics support requirement will vary with the mutual support available from co-based organizations, but in all cases, logistics planning must include:

(1) Fueling support both at the assigned air base and in flight.

(2) Ground support equipment allowances.

(3) Electrical power availability, 115/220 VAC, 400 cycle and 60 cycle.

(4) Availability of up to 2,000 gallons of fresh water per day plus waste disposal for photo processing.

(5) Aerial transport of photo processing vans and required maintenance vans and equipment.

(6) Billeting.

(7) Aircraft supply support.

(8) Vehicular support.

e. The immediate imagery interpretation center (IIIC) must be collocated with the VMFP squadron.

f. Limitations (see par. 4304).

4308. AIR SUPPORT REQUIREMENTS

Air support requirements are contingent upon the specific missions to include the enemy threat.

a. For long range reconnaissance, aerial tanker support is needed. Available refuelers in the FMF are described in the NATOPS Air Refueling Manual.

b. Enemy defenses will determine requirements for electronics countermeasures or fighter support. Available aircraft in the FMF are described in FMFM 5-1, Marine Aviation.

4309. REQUEST PROCEDURES

(See par. 4410.)

4310. DISSEMINATION

(See par. 4411.)

4311. REPORTS

The only reconnaissance report generated by the VMFP squadron is the Joint Tactical Air Reconnaissance/Surveillance Inflight Report (Flight Rep). (See app. E.)

Section IV. IMAGERY INTERPRETATION

4401. GENERAL

a. The importance of imagery interpretation has been demonstrated effectively in World War II, the Korean Conflict, and the Cuban Crisis. In World War II, military experts found that almost 40 percent of the intelligence was derived from aerial photography. Additionally, imagery intelligence provided a considerable portion of the intelligence information gathered in Vietnam.

b. The primary role of imagery interpretation is to provide intelligence information to the commander. This information is provided by reports furnished by the photographic imagery interpretation units.

4402. PURPOSE

The overall purpose of the photographic imagery interpretation units is to produce and disseminate information of intelligence value derived from the interpretation of aerial reconnaissance imagery flown by the Marine tactical reconnaissance squadron and Marine observation squadron, or other Services in support of the Marine Corps.

4403. CAPABILITIES

a. The imagery interpreter is capable of providing imagery interpretation reports and special studies in response to the commander's essential elements of information (EEI) and other information required (OIR). He is capable of identifying items of immediate tactical significance, assisting in operational planning, and providing a current accurate display of an area of interest to the commander to assist him in the tactical employment of his combat troops and tactical weapons.

b. The imagery interpreter has much the same view of the terrain as the air observer, but there are two important differences. First, the air observer cannot truly see the terrain in three dimensions except at very low altitudes; the interpreter, with the aid of a stereoscope, can. Second, the air observer has a very limited time to observe a section of terrain, whereas the image interpreter can study the same area for hours and with the aid of magnifiers. The accuracy and detail of image intelligence reports are a definite asset to the tactical commander.

4404. LIMITATIONS

a. The imagery interpreter cannot always see the fine detail of a target. For example, although the height and length of a fortified bunker may be determined from a photograph, information as to its structional condition must usually come from the ground observer.

b. The observations of the imagery interpreter are limited to the areas shown on the imagery. It is quite possible that the most important intelligence feature in an area may occur just off the edge of the imagery or under a patch of clouds. The interpreter's observations are further limited by objects such as overhanging vegetation, intervening terrain, or shadow.

c. Time factors are always vital in producing intelligence. It must be remembered that there is a time lag between the request for imagery reconnaissance and receipt of the imagery interpretation report during which the enemy situation can change.

4405. TASKS ASSIGNED

a. The photographic imagery interpretation units are capable of providing the commander with:

(1) Beach Studies.--This study provides the commander amphibious task force and commander landing force with an evaluation of a beach; i.e., shoreline, related coastal terrain, and bottom conditions in the shore area. It can sometimes provide detailed data on shore water depths, but it cannot confirm deep water sounding.

(2) Terrain Analysis.--This study includes trafficability analysis of terrain for all types of military operations to include road and bridge studies.

(3) Target Folders.--A target folder includes all available intelligence about the targets which permits target analysis and weapons selection.

(4) Intelligence Information

(a) Information obtained from other sources or agencies such as order of battle (OOB), interrogation of prisoners of war, and clandestine sources is collated at the intelligence collection center.

(b) The location of enemy supply installations, lines of communications, information on forward area supply depots, rear area supply depots, railheads, transhipment points, and main supply routes can be ascertained.

(c) The locations of enemy personnel and equipment concentrations can be detected.

(d) Determinations of the type and extent of damage inflicted on a target can be made.

(5) Airfield Studies.--This study is usually produced when the data on airfields and seaplane stations of the world (ASSOTW) are not available. Additionally, it can be used to update existing ASSOTW.

(6) Uncontrolled Mosiacs and Panoramas.--Uncontrolled mosiacs and panoramas may be used for planning and briefing purposes. However, preparation of large uncontrolled mosiacs, or panoramas, is time-consuming and should be resorted to only when an imagery report or current map coverage will not suffice.

(7) Helicopter Landing Studies.--This study includes the size of the helicopter landing zone, surrounding terrain, and obstacles.

(8) Terrain Model.--The terrain model can help the commander plan his scheme of maneuver, since the model is a three-dimensional representation of a portion of the surface of the earth to a set scale; however, construction of a model is very time-consuming and expensive.

4406. ASSETS AVAILABLE

There are three fixed-wing aerial platforms organic to the Marine Corps that are capable of providing photo/imagery: the RF-4, OV-10, and AV-8. If required, the Marine air observer utilizing the AH-1/UH-1 helicopter is capable of providing handheld aerial photography. However, the VMFP squadron with organic RF-4 aircraft is the only unit with organic film developing laboratory facilities. While the AV-8 has a capability [illegible] photographs it is very limited as the only camera position available is side oblique.

4407. TACTICAL EMPLOYMENT CONSIDERATIONS

The photo imagery interpretation teams are task organized for deployment to any command echelon. Normally, however, they are located so as to have immediate access to the film processing facilities serving the units employing the airborne reconnaissance sensors. This assures the immediate availability of skilled interpreters and eliminates administrative dead time.

4408. IMMEDIATE IMAGERY INTERPRETATION CENTER

a. The IIIC, when activated by force headquarters or the Marine amphibious force, will be employed to support operations conducted by Marine amphibious force/Marine amphibious brigade/Marine amphibious units.

b. The IIIC will be composed of members of the photographic imagery interpretation units organic to FMF ground and air units. The purpose of the IIIC is to conduct a rapid interpretation of imagery received and to disseminate critical information by spot report. Less critical information is disseminated by initial photographic imagery interpretation reports (IPIR). The IIIC does not perform detailed interpretation, nor does it accomplish the processing and distribution of photography/imagery. Any required detailed interpretation is performed by those imagery interpretation personnel remaining with ground and air components of the MAGTF. Since the purpose of the IIIC is speed, it will be collocated with the VMFP squadron so that there is no lost time in obtaining the imagery for interpretation. Furthermore, a positive, rapid means of communication must be provided between the IIIC and major units of the landing force.

4409. SUPPORT REQUIREMENT

a. The AN/RSP-82 imagery interpretation facility (IIF) provides the nucleus for the IIIC, and when deployed, several support requirements must be taken into consideration.

(1) If no commercial power is available, two PU708 generators and adequate fuel to run the generator will be required. The power source, whether provided commercially or by generator, must be a four-wire, three-phase 120/208 volt AC, 100 ampere, 60 hertz power source. The power input variation must not exceed plus 5 or minus 10 percent nominal voltage or 57 to 63 hertz. The IIIC requires approximately 25.3-kilowatt power when all equipment is operating.

(2) Transportation to the communication center is required if the center is not collocated or in proximity of the IIIC.

b. In the deployment of imagery interpretation teams, limited support requirements are required, since the team possesses the required tools to accomplish the assigned tasks.

c. Early liaison should be established with the photographic imagery interpretation unit (PIIU) to establish any additional support requirements.

4410. REQUEST PROCEDURES

a. The commander requesting imagery must consider several factors; i.e., the essential elements of information or other information required, and the time required for the information, to assist him in the completion of his mission.

b. The Joint Tactical Reconnaissance Surveillance Request Form will be used for all requests and submitted via the chain of command to the first headquarters having imagery interpreter support, or in accordance with instructions issued by higher headquarters.

c. In completing the imagery request, the EEI or OIR should be specific to enable the imagery interpreter, in completing the Joint Tactical Reconnaissance Surveillance Request, to select the appropriate scale and sensor system to satisfy the commander's request. Appendix C contains instructions and a sample format for the Joint Tactical Reconnaissance/ Surveillance Request Form.

4411. IMAGERY INTERPRETATION REPORTS

a. The imagery interpretation report formats contained in this manual are not all compatible with those established in NATO Standardization Agreements. When operations involve NATO organizations, the NATO reporting format will be substituted for ease of international understanding. See ATP 27(A), Offensive Air Support Operations, for format.

b. The basic types of imagery interpretation reports are the mission report (MISREP), initial photo interpretation report (IPIR), and the supplemental photographic report (SUPIR). Imagery interpretation reports serve two objectives--they ensure the maximum exploitation of information and its timely dissemination to the requester. Dissemination of these reports is discussed in paragraph 4412.

c. All of these reports follow a prescribed format. This facilitates electronic transmission and ensures that the information is complete and understandable to the recipient.

(1) Mission Report.--A MISREP is submitted at the conclusion of each mission. It is based on the notes and observations made during the debriefing of the crew by the imagery interpreter and includes any in-flight reports made by them. Preparation and dissemination of MISREP's are accomplished as rapidly as possible after completion of the mission, normally not later than 30 minutes after aircraft touchdown. The format for a mission report has been standardized for NATO and non-NATO operations. (See app. F.)

(2) Initial Photo Interpretation Report.--The IPIR is the preliminary rapid interpretation of newly-acquired imagery and is furnished only when specifically asked for by the mission requester or when the full

interpretation of the imagery reveals additional intelligence information not previously reported on the MISREP. The IPIR is normally completed within 1 to 3 hours after the aircraft has returned and the imagery has been developed. A sample format and instructions for an IPIR is contained in appendix G. IPIR preparation instructions are contained in DIAM 57-5A, DOD Exploitation of Multisensor Imagery. For NATO operations, see ATP 27(A), Offensive Air Support Operations, for format and preparation of the IPIR.

(3) Supplemental Photo Interpretation Report.--The SUPIR is the systematic review of newly-acquired imagery. This report provides information which supplements that provided by the IPIR and may be published intermittently. The SUPIR will be in the same format as the IPIR. A sample format for the SUPIR is contained in appendix G. Preparation instructions are contained in DIAM 57-5A, and for NATO operations in ATP 27(A).

4412. DISSEMINATION

a. Dissemination, or the transmission of the MISREP, IPIR, and SUPIR, is most important. Without proper dissemination, the imagery interpreter reports of intelligence information is less than effective. Since the reports are items of perishable nature, the timeliness of dissemination is critical.

b. These reports may be disseminated electrically, by land line, radio, or courier.

c. The message precedence of reports will be dictated by the request priority/precedence.

d. The report will be assigned a security classification according to the degree of classified information that it contains or according to the methods by which it was obtained.

4413. MARINE AIR-GROUND INTELLIGENCE SYSTEM (MAGIS) IMAGERY INTERPRETATION SEGMENT

a. In 1963, the Commandant of the Marine Corps directed the development of an integrated air-ground intelligence system. One of the segments of the system is the imagery interpretation (II) segment.

b. The II segment is designed to decrease the time lag between the gathering of intelligence information and its dissemination. It will provide the normal initial photo interpretation reports and supplemental interpretation reports in a much shorter time frame. Additionally, it may provide a third phase of reporting, which would include special intelligence requirements of the commander. This phase would include such items as mosaics and special studies.

Section V. ELECTRONIC RECONNAISSANCE

4501. GENERAL

Electronic reconnaissance missions can be requested by either the ground or the air commander to provide necessary information concerning electronic emitters in an area of operations, or potential operations, and relative information on the overall enemy situation. The Marine tactical electronic warfare squadron (VMAQ-2) is the only Marine Corps unit fully capable of performing airborne electronic reconnaissance. VMAQ-2 is transitioning to the EA-6 aircraft and presently is equipped with both the EA-6 and the EA-6 aircraft. VMAQ-2 normally supports the air reconnaissance mission with detachments of four aircraft; however, the situation and size of the MAGTF may dictate additional aircraft or detachments. For additional information, see FMFM 2-3, Signals Intelligence/Electronic Warfare Operations (U).

4502. MISSION

The mission of the VMAQ is to conduct airborne electronic warfare in support of FMF operations.

4503. CAPABILITIES

Electronic warfare aircraft provide the capability of conducting electronic reconnaissance during day, night, and all-weather conditions from standoff ranges that often allow it to go undetected. The EW systems provide detection, identification, and location of the enemy emitters. This information is recorded for further evaluation, interpretation, and analysis to produce local electronic intelligence on a tactical level. Some capabilities of airborne electronic reconnaissance to be considered when planning are:

a. It provides a 24-hour all-weather surveillance capability.

b. It provides up-to-date information on the disposition of enemy forces by locating their electronic emissions.

c. It can be conducted at high altitudes and at standoff ranges outside enemy air defenses.

d. Time-on-station and radius of action can be extended by air refueling.

e. The missions can be preplanned to a great extent making the requirement for communications and control minimal.

4504. LIMITATIONS

In the planning stage for aerial electronic reconnaissance, limitations should also be considered. One of the more significant limitations is the location accuracy of the electronic reconnaissance systems as compared to visual and multisensor imagery. Other significant limitations include:

a. Passive System.--Interception is dependent on emissions from enemy systems. If emitter is not turned on, it cannot be located.

b. Radius of Action.--As in any aircraft, the radius of action is limited by fuel on board. Aerial refueling can help reduce this limitation but requires additional planning and coordination.

c. Time-on-Station.--Time-on-station is also influenced by fuel on board and, additionally, by distance to station from the base and fuel consumption which is dependent on airspeed and altitude.

d. Communications/Navigation.--The reliance on communications and navigation aids can be a limitation in a hostile electronic warfare environment. VMAQ operations require accurate optimum support position for ECM tasking and precise navigational data to develop accurate intelligence from ESM tasking.

e. Air Defense System.--As in any other airborne station, the electronic warfare aircraft is vulnerable to hostile air defense systems and care should be taken in planning the route to take advantage of its standoff capability and avoid known or suspect air defense systems.

f. Line-of-Sight.--Although in most cases the electronic warfare aircraft can intercept emissions at a range greater than the emitter's detection capability, it still must be at sufficient altitude to maintain line-of-sight to the emitter.

4505. TASKS ASSIGNED

Some of the tasks assigned to VMAQ-2 and its detachments consist of the following:

a. Conduct airborne tactical electronic reconnaissance operations.

b. Conduct airborne ESM and airborne ECM operations.

c. Process tape recordings and provide reports of intelligence obtained from tasks listed in subparagraphs 4505a and 4505b.

d. Process and provide up-to-date electronic order of battle information from recorded tapes and external sources.

e. Conduct ECM operations for ECCM training of FMF units.

f. Maintain the capability of operating from aircraft carriers, advanced bases, and expeditionary airfields within the capability of assigned aircraft.

g. Maintain the capability to operate during hours of darkness and under instrument flight conditions.

h. Maintain the capability of deployment or extended operations employing aerial refueling.

i. Be prepared to deploy detachments aboard carriers to advanced bases and expeditionary airfields.

j. Process and provide electronic intelligence reports as directed in accordance with assigned tasking.

k. Provide liaison personnel to wing and landing force staff officers to assist in VMAQ employment planning.

l. Perform organizational level maintenance on assigned aircraft.

4506. ASSETS AVAILABLE

The VMAQ-2 squadron contains all the Marine Corps airborne electronic warfare assets. It currently contains the EA-6A aircraft and is in the process of transitioning to the newer EA-6B aircraft. The current ground processing capability consists of the AN/TSQ-90 vans, but these are due to be updated to the tactical electronic reconnaissance processing and evaluation system (TERPES).

a. EA-6A.--The EA-6A is a two-place jet electronic warfare aircraft with limited attack capabilities. Long mission radius or loiter time, high payload, and side-by-side cockpit arrangement designed for maximum efficiency, visibility, and comfort, coupled with seven-station capacity for ECM and ESM pods, fuel tanks, and/or weapons provide exceptional mission capability. Its maximum speed is about 550 knots and a minimum speed of about 210 knots is required to operate the jammers. The aircraft is normally configured with jamming pods, chaff pods, and external fuel tanks in various combinations depending on the mission.

(1) Communications/Navigation.--The EA-6A communication system consists of a UHF (225-400 MHz) receiver-transmitter and an auxiliary UHF receiver. Navigation is provided by the tactical air navigation system (TACAN) and by the UHF automatic direction finding equipment (ADF). Additionally, the aircraft is equipped with search radar, doppler radar, radar altimeter, and navigation computer systems to aid in navigation. Identification information and control is provided by the identification friend or foe/selective identification feature (IFF/SIF) system and secure voice is provided by the KY-28 system.

(2) Weapons System.--The electronic warfare weapons systems consist of the ALQ-86 countermeasurers receiver, ALH-6 recorder, ALQ-76 ECM pod, and ALE-32/41 chaff pods. The receiver is the heart of the system and it operates in a semiautomatic mode to provide the ECMO the capability to detect, analyze, identify, and obtain any directional bearing of emitters within its frequency reception capability. The recorder system provides both analog and digital tapes of the analyzed signals for postmission analysis. The ECM pods contain four transmitters each and provide barrage or spot noise jamming to counter enemy systems. The chaff pods provide the capability of dispensing a large volume of chaff to form a corridor or cover an area.

b. EA-6B.--The EA-6B is a four-place electronic warfare jet aircraft capable of being employed in either an ECM or an ESM capacity. Its maximum speed is about 550 knots; its minimum speed for full jamming capability is 220 knots; its cruise speed is normally 300-400 knots. Its loiter time depends on its external store configuration, altitude, and airspeed. External stores are limited to fuel tanks or tactical jamming pods (TJP's); any combination of these may be carried up to a total of five. Nominal range is about 1,853 kilometers (1,000 miles). The EA-6B is currently in three versions: standard, expanded capability (EXCAP), and improved capability (ICAP). The Marine Corps will have only the ICAP version. All versions employ the ALQ-99 tactical jamming system (TJS) as their primary weapon system.

(1) Navigation and Communications.--The ICAP version of the EA-6B has one HF radio (20.5-30.0 MHz), two UHF radios (225-400 MHz), and one VHF radio (118-135 MHz). Secure voice communications equipment (KY-28) is available. All versions have navigation radar, doppler navigation radar, TACAN, IFF/SIF transponder, radar altimeter, and a UHF ADF receiver. All versions also use a part of the AVA-6 computer for navigation purposes. The computer is capable of providing direct latitude/longitude readout of position, true airspeed, ground speed, drift angle, wind direction and velocity, and the range, bearing, and time to selected geographic positions.

(2) ALQ-99 Tactical Jamming System (TJS).--The TJS is operated by by the electronic warfare officer, while the third electronic warfare officer operates the ALQ-92 communication jammer, the aircraft's radar, and navigation equipment. The TJS consists of the onboard system (OBS) and the external pod mounted tactical jamming pods. The OBS is used to detect, identify, and display parameters to the operator. These parameters are also used by the computer to tune the jammer pods and select the appropriate modulation.

(3) Digital Recorder.--The EA-6B also has a digital recording system that can record approximately 3 hours of navigation and electronic warfare activity data. The resulting magnetic tape can be processed by the TERPE after recovery. There is no provision for changing or processing the tape while airborne, but a data link system is being investigated and may be available in the future.

c. TSQ-90/TERPE.--The AN/TSQ-90 is a ground data readout system designed to process both analog and digital tapes containing electronic reconnaissance mission data. The TSQ-90 has been operationally employed in support of the EA-6A since 1967. The existing TSQ-90, with additional hardware and new software, was considered adequate to fulfill TERPE requirements.

(1) Role of TERPE Segment.--The TERPE segment will provide a rapid processing capability to the VMAQ-2 squadron and its detachments. The processed intelligence will be fed to the wing intelligence analysis center (IAC). The TERPE segment has a "stand alone" capability from the IAC, but is required by the EA-6 to complete the electronic reconnaissance mission.

(2) Functional Tasks.--The TERPE segment will perform the following functional tasks:

(a) Rapidly translate machine readable data, both digital and analog, from the airborne collector, into man-readable reports.

(b) Correct erroneous navigation data or other false aircraft system data.

(c) Identify electronic emitters by using various electronic parameters.

(d) Locate emitters by coordinates with the particular circular error probable (CEP) for each site.

(e) Correlate new information with existing data.

(f) Publish mission results as TERPES outputs by means of paper and magnetic tapes, punch cards, teletype, or secure voice.

(g) Maintain the capability to accept data from both semiautomatic and automatic airborne collection systems.

4507. TACTICAL EMPLOYMENT CONSIDERATIONS

a. As in any air support mission, there are many considerations involved when planning tactical employment of electronic warfare aircraft. All of the previously mentioned capabilities and limitations must of course be considered. There are also some additional considerations, especially for the MAGTF.

b. Since there is only one VMAQ squadron, most operations will be supported by a detachment of four aircraft. This poses a considerable problem when planning reconnaissance and electronic warfare missions for around-the-clock operations. Care should be taken not to overcommit the electronic warfare resources, since aircraft availability may necessitate cancelling missions.

c. The limited resources can normally be best used by assigning electronic reconnaissance missions prior to D-day to update local EOB's. After D-day, the reconnaissance can normally be done in conjunction with an electronic warfare mission, and the ECM support should have priority with electronic reconnaissance missions flown when possible to supplement information collected on other flights.

d. The EA-6 is capable of operating off aircraft carriers and should be employed in this role in support of amphibious operations, since it can provide continous support through the landing phase.

4508. AIR SUPPORT REQUIREMENTS

a. In addition to the normal logistic requirements common to all squadrons, there are several additional requirements for the electronic warfare aircraft. Due to the limited assets available, it will frequently be required to aerial refuel the electronic warfare aircraft to increase its mission time. This should be considered in planning, and refueling on or near station should be done if possible to reduce lost mission time.

b. Since the EA-6 is unarmed and not yet configured with a defensive electronic countermeasures system to combat air intercept threat radars, some ECM and ESM missions will require fighter escort. This will depend on the track being flown and the current and projected enemy situation when assigning missions.

c. The TSQ-90/TERPES is required to support the EA-6 mission and should be deployed along with the aircraft in order to reduce processing time for mission tapes.

4509. REQUEST PROCEDURES

Requests for electronic warfare missions should be made utilizing the Joint Tactical Electronic Warfare Request Form found in appendix H. This request will be forwarded to the tactical air command center which will, in turn, coordinate with other units and issue the frag order to the electronic warfare squadron or detachment.

4510. DISSEMINATION

The information obtained from the electronic warfare missions would be processed in the TERPES and the appropriate reports generated. These would be passed to the wing or MAF intelligence center under the Marine air-ground intelligence system concept and be disseminated to the various agencies. One report utilized is the Joint ESM/ECM Report in appendix I.

4511. REPORTS

In addition to the above report, additional reports are the In-Flight Report (see app. E) and the Mission Report (see app. F). These reports are explained in the appendixes and are used when required.

CHAPTER 5

COMMAND, COORDINATION, AND COMMUNICATIONS

Section I. INTRODUCTION

5101. GENERAL

The coordination of Marine aviation air reconnaissance forces is of considerable scope and at times complex. Participation in joint operations, the range capabilities of fixed-wing aircraft and helicopters, the communications needed to control widely dispersed aircraft, and the integration with artillery and naval gunfire units all require extensive planning and precise execution for effective command and control.

5102. COMMAND AND STAFF RELATIONSHIPS

Command and staff relationships are discussed in detail in FMFM 3-1, Command and Staff Action. The areas unique to aviation commands are further discussed in FMFM 5-1, Marine Aviation. Amplification here is directed toward air reconnaissance and air-ground commander relationships.

a. Command.--It is essential that all subordinate commanders have access to the landing force aviation commander. Units either land-based or embarked upon amphibious shipping must rely on either radio communications or messenger service to provide this access when the landing force aviation commander is afloat. Ashore, the units may augment the above methods with landlines.

b. Staff.--The organization of the squadron and group staff is explained in FMFM 5-1. Although aviation command staff members are not integral elements in the chain of command, they will often play a more active role in the decision making processes than their counterparts at the battalion/regimental levels. This is because the aviation commander is sometimes absent, often 2 to 3 hours or longer, as he assumes his leadership role in flight operations; therefore, the commander must rely heavily on the advice of his staff and, in fact, on its capacity to make responsible decisions in his absence.

5103. SPECIAL STAFF

Special staff officers are found at the wing, group, and squadron levels. At the squadron level, these are the safety and NATOPS officers and, when independently deployed, the flight surgeon. Air observers assigned to a squadron are an integral part of the command. At the wing and group levels, they are the aviation maintenance officer, aviation ordnance officer, avionics officer, and flight surgeon. The duties of these officers are discussed in FMFM 5-1, Marine Aviation. Additional special staff officers, common to both aviation and ground organizations, are discussed in FMFM 3-1, Command and Staff Action.

5104. AFFILIATION WITH THE NAVY

The mission of Marine aviation is primarily to participate in the seizure and defense of advanced naval bases. As a collateral mission, it participates as an integral component of naval aviation. As this component of the mission assigned indicates, there is a close relationship with the Navy, both operationally and logistically. Although the Marine Corps has the unique ability to provide its own aviation element of the air-ground team, it is still dependent upon the Navy, not only to provide Marine aircraft, but to equip and supply spare parts for them as well.

a. Operational Chain of Command.--A landing force is under the operational control of the Navy, but administratively under the control of the appropriate Fleet Marine Force commander. Landing force aviation, as an element of the landing force, is under the operational control of the Navy. Occasionally, Marine aviation supplements the naval air forces and will, in those instances, be under the direct operational control of a fleet or task force commander.

b. Aviation Procurement and Logistic Chain.--As already mentioned, the Navy provides the aircraft for the Marine Corps. The Commandant of the Marine Corps determines Marine Corps requirements and provides that information to the Chief of Naval Operations (CNO). The CNO then supplies the aircraft and support required through a series of naval commands shown in FMFM 5-1, Marine Aviation.

c. Technical and Administrative Control.--Technical and administrative control of Marine aircraft is exercised by a "Navy type" command. A type command is an administrative subdivision of a fleet or force into ships or units of the same "type," as differentiated from a tactical subdivision. Commander Naval Air Forces, Atlantic and Pacific (COMNAVAIRLANT and COMNAVAIRPAC) are type commanders responsible to the fleet commander for the training and readiness of aviation units of the fleet, including aircraft carriers. They are the controlling custodians of all Navy and Marine aircraft. Fleet Marine Force, Atlantic (FMFLANT) and Fleet Marine Force, Pacific (FMFPAC) exercise operational control of Marine aircraft at the service level, and as type commanders, they share with COMNAVAIRLANT and COMNAVAIRPAC the common superiors, Commander in Chief, Atlantic Fleet (CINCLANTFLT) or Commander in Chief, Pacific Fleet (CINCPACFLT).

Section II. COMMAND RELATIONSHIPS

5201. GENERAL

Because amphibious warfare integrates virtually all types of ships, aircraft, weapons, and landing forces in a concerted military effort against a hostile shore, the Marine Corps is frequently engaged in joint operations and, normally, as an element of a joint task force. A joint task force, as defined by JCS Pub 2, Unified Action Armed Forces (UNAAF), is "a force composed of assigned or attached elements of the Army, the Navy or the Marine Corps, and the Air Force, or two or more of these Services, which is constituted and so designated by the Secretary of Defense or by the commander of a unified command, a specified command or an existing joint task force." Either the Navy, Marine Corps, or both may provide elements to a joint operation. If both are employed, the senior element will be considered the Service component. For instance, if the Navy is the Service component, the Marine Corps will be an element of the Naval component.

5202. JOINT COMMAND

In view of the organization of the United States Armed Forces throughout the world today, the MAGTF will frequently be required to participate in combat action as a component of a joint force. Therefore, it is necessary to examine and standardize certain general applications of the Marine aviation effort in joint operations. See JCS Pub 2; JCS Pub 8, Doctrine for Air Defense From Overseas Land Areas; and JCS Pub 10, Tactical Command and Control and Communications Systems Standards (U), for a more detailed discussion of MAGTF participation in joint operations.

a. Marine Air-Ground Task Forces.--The close integration of air and ground operations is a basic tenet of Marine Corps policy. Whenever Marine forces are committed to joint operations, they will be task organized into the MAGTF which will include all elements necessary to operate as an integrated air-ground team.

(1) Operational Control of the MAGTF Within a Joint Force.--The ideal situation, where the MAF is a part of a larger joint force, is to give the MAF a separate operational area and have the commanding general, MAF report directly to the joint force commander. Where the MAF is part of an amphibious task force, the relationship is clear, the commanding general, MAF reports to the CATF during the assault phase. It is upon passing control ashore and disestablishment of the AOA and the ATF that problems arise. The preferred arrangement would be for the commanding general, MAF to report directly to the joint force commander, but this is not always possible or convenient. The MAF operational area might be contiguous to the operational areas of other forces (Army), and therefore, the MAF would probably be attached to or come under the operational control of a larger ground force, such as an army corps or field army. In any event, the MAF should remain in contact with its naval support.

(2) MAGTF Integrity Within a Joint Force.--The MAF, MAB, and MAU are tactical entities. Particularly in the case of the MAF, the commander must retain complete operational control over all of its elements. This is mandatory to retain the unique capabilities of the Marine air-ground team. Operational control of the MAW passed to the Air Force component commander is not desirable and should be avoided if at all possible.

b. Command Relationships

(1) Two basic principles governing command relationships are set forth in JCS Pub 2, Unified Action Armed Forces (UNAAF).

(a) The joint force commander exercises operational command of assigned forces through his Service component commanders or uni-Service force commanders.

(b) The joint force commander maintains organizational intregrity of his Service components insofar as practicable in order to exploit fully the inherent overall combat effectiveness of the component.

(2) The Marine air-ground task forces assigned to a joint force will operate under a naval component commander or as a uni-Service force. If the naval component consists predominantly of Marine Corps forces, the commander of the MAGTF will be designated naval component commander.

(3) Operational command of an MAGTF assigned to a joint force will be exercised by the joint force commander through the naval component commander.

(4) The relationship that exists between an MAGTF and other Service components of a joint force is one of coordination and mutual support.

5203. NAVAL COMMAND

As discussed in paragraph 5104, the mission of the Marine Corps places the landing force within the naval operational chain of command. Operational control of landing force aviation is exercised through the commander of the landing force. Aviation supply support will be provided by the amphibious task force during the period that the helicopter units are embarked.

5204. LANDING FORCE

Where preponderance of tactical aviation comes from the Navy or Marine Corps, the overall air effort in the objective area will be directed by a naval aviator under the CATF until control is passed ashore. The officer so designated will be responsible for the preparation of the amphibious task force air plan. In execution of the plan, he will use the control agency designated by the joint amphibious task force commander. Landing force aviation will be organized as a subordinate task organization of the landing force. (See fig. 20.)

a. Landing force aviation is represented by the commander landing force during all phases of the operation, even when the control of all air is vested in the CATF. Since immediate responsibility for the conduct of landing force operations ashore is vested in the commander landing force, the planning and execution of the landing and assault are primarily his concern. The speed and mobility of aircraft and the requirement to be responsive to the cognizant commander make it essential that control of air be exercised by that commander.

b. As early as possible, the commander landing force establishes air control facilities ashore that parallel those of the CATF. Upon the

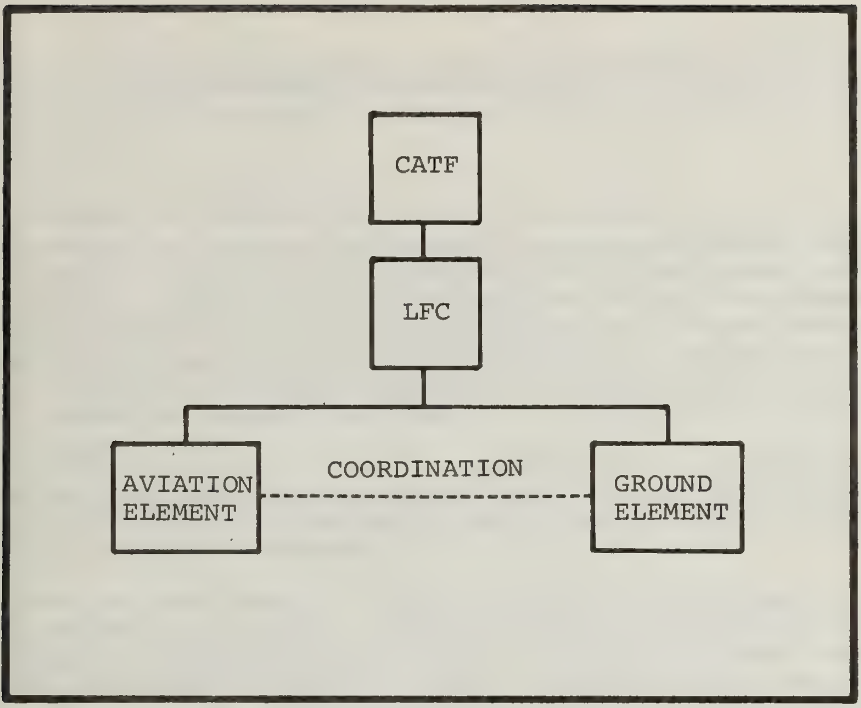


Figure 20.--Command Relationships Within an MAGTF (Operational Phase).

recommendation of the commander landing force, the CATF may pass responsibility for control of air operations to the commander landing force. The passage of control may be in stages; i.e., control of close air support may be passed ashore prior to control of other air operations. After passage of any or all control functions ashore, the Navy control centers afloat continue to monitor appropriate circuits, ready to assume active control in the event that it becomes necessary.

Section III. FUNCTIONAL COORDINATION

5301. GENERAL

Functional coordination is a major requirement of Marine reconnaissance. In this sense, it refers to the simultaneous coordination with all Marine aviation functions. It is apparent that aviation activities can conflict with each other in the same or adjacent airspace. Airspace control is designed to minimize this potential conflict and to regulate activity when a conflict arises. Control is obtained according to a set of preestablished priorities established by the MAGTF commander through his TAC. Functional coordination has four aspects in its application, all of which interact:

a. Intratheater Coordination.--This is the coordination required to govern the use of airspace on a scale much larger than that which affects a sector. Aircraft will routinely transit a sector or enter from an adjacent sector. This interaction requires a centralized authority for coordination.

b. Intrasector Coordination.--An additional need exists to coordinate multiple aircraft activity within a sector. This requirement generates the unique characteristics of the particular air command and control system. The approach followed by the MACCS for assault support operations will be discussed in subsequent paragraphs.

c. Coordination of Air Operations With Ground Operations.--To regulate air activity within one sector is not sufficient. Aircraft operate in a sector to support a ground commander; therefore, a requirement exists to coordinate air activities with those ground activities which are dependent upon use of airspace; artillery as an example. In this instance, there is a requirement which generates unique characteristics of the particular air command system: how it integrates with other supporting arms and the ground commanders' activities.

d. Technical Coordination.--Technology has advanced in some areas of air activity faster than in others. Needs have become more demanding, creating a situation wherein control of some aviation functions is heavily dependent upon technology. This dependence establishes a requirement for both manual and semiautomatic systems coordination which is in a continuous process of development within the Marine Corps as new items of equipment are introduced.

5302. INTRATHEATER COORDINATION

In view of the organization of the United States Armed Forces throughout the world today, the MAGTF will frequently be required to participate in combat action as a component of a joint force. It is, therefore, necessary to examine and standardize some applications of the Marine aviation for its role in such operations. See JCS Pub 2, Unified Action Armed Forces (UNAAF); JCS Pub 8, Doctrine for Air Defense From Overseas Land Areas; JCS Pub 10, Tactical Command and Control and Communications Systems Standards (U); and LFM 04/NWP 17, Doctrine and Procedures for Airspace Control in the Combat Zone (U), for a more detailed discussion of MAGTF participation in joint operations.

a. Sector Assignment.--Plans for joint operations involving the MAGTF should provide, as is pointed out in JCS Pub 8, that a specific sector or area of responsibility be given to the MAGTF. The boundaries of this sector should be predicated upon the air defense and airspace control capability of the MAGTF, and will normally include the zone of action and objectives assigned.

b. Control and Coordination

(1) The joint force commander is responsible for providing overall guidance for the effective use of tactical air resources, including the general priorities and restraints to be applied, with due regard for the needs of subordinate commands and the maintenance of organizational integrity. He also establishes procedures to coordinate the employment of air resources with those agencies which require its support, and the control of airspace, as well as the reallocation of tactical air resources when it becomes necessary to meet emergencies.

(2) The joint force commander should coordinate air operations and airspace control through a coordinating authority for air (CAA), designated by the joint force commander.

(a) The CAA should normally be a member of the joint staff, operating from the joint combat operations center (joint COC). The coordination of tactical air operations and control of airspace are functions so vital to the overall success of the mission that they must be exercised by the joint force commander through a joint agency. In exceptional situations, it may become expedient for a component or supporting commander to be designated as the CAA. Such might be the case when that commander is providing the preponderance of tactical air assets and possesses the requisite capabilities to exercise the authority.

(b) The joint CAA, under the direction of the joint force commander, shall establish guidelines and procedures and supervise the coordination of tactical air operations through the compatible and mutually supporting tactical air control systems of the components.

(c) Centralized direction by the CAA does not imply assumption by the CAA of operational control over any air assets. The CAA has the authority to require consultation between the agencies involved, but does not have the authority to compel agreement. Matters on which the CAA is unable to obtain essential agreement shall be referred to the joint force commander for resolution.

(3) The MAGTF commander, through his tactical air commander and the agencies of the Marine air command and control system, commands, controls, and coordinates Marine tactical air operations. The MACCS, while primarily responsive to the MAGTF commander, must also be compatible with and supportive of other like systems within the joint force. The TACC/TADC is the primary point of contact for operational aviation coordination with the CAA and forces external to the MAGTF, although subordinate agencies may interface directly to exchange information. When engaged in joint operations, aircraft of more than one Service may be required to traverse and/or conduct operations in portions of the same airspace, thereby necessitating procedures to minimize mutual interference and to maximize operational effectiveness and safety. Under such conditions, it is essential that all aircraft operate under an integrated airspace control system. Any airspace control system must, however, be responsive to the ground commander's need for artillery and/or naval gunfire support, as well as providing for air defense

and ensuring flight safety. The joint force commander establishes general airspace control procedures and responsibilities to achieve the maximum safety and operational effectiveness. The joint coordinating authority for air is additionally responsible for the coordination of airspace control. The purpose of any coordination must be to maximize effectiveness and efficiency. In this case, however, the effectiveness of the coordinated ground, surface, and air effort is the prime consideration, not merely to increase efficiency. Within the MAGTF sector of responsibility, the TAOC is the major en route air traffic control facility, and the detachment, Marine air traffic control squadron (MATCS) provides terminal air traffic control.

c. United States Air Force Tactical Air Control System (TACS).--The necessity to operate aircraft of more than one Service within the same airspace and coordinate supporting ground fires requires familiarity with the functions of appropriate air control agencies of the other Services. During land combat operations, the Marine Corps air control effort will interface with the Air Force tactical air control system. The Air Force component commander uses the TACS to exercise centralized control over his forces, to monitor the air-ground situation, and when designated as the airspace control authority, to coordinate, integrate, and administer the airspace over the combat zone. TACS provides the organization and equipment necessary to plan, direct, and control Air Force tactical air operations and coordinate joint air operations with components of the other services. Within the TACS are found the appropriate agencies required for general direction, procedural guidance, and coordination of friendly air activity. For a description of the Air Force tactical air control system, see FMFM 5-1, Marine Aviation.

5303. INTRASECTOR COORDINATION

Intrasector coordination involves direct air support (DAS) operations (which includes air reconnaissance), assault support, and antiair warfare. This publication will discuss direct air support, since antiair warfare is covered in FMFM 5-5, Antiair Warfare, and assault support is covered in FMFM 5-3, Assault Support.

a. Direct Air Support.--The following is a summary of participation from a coordinating agency point of view:

(1) TACC/TADC.--As the supervisory authority for the MACCS, the TACC/TADC constantly requires current information concerning air operation. This will be provided by receiving inputs from the DASC and TAOC regarding the specific functional activity for which they are responsible. The TACC/TADC consolidates this information and employs it in making decisions of a supervisory nature. The TACC/TADC normally controls air reconnaissance aircraft and has the authority to divert aircraft from preplanned missions should the need arise. Both of these functions may be delegated to the DASC if the situation allows or dictates and if priorities are clearly defined. The DASC and/or TAOC receive the final mission assessment for the missions conducted and forwards this information to appropriate agencies as designated by the tactical air commander.

(2) TAOC.--The TAOC participates in the conduct of air reconnaissance primarily by providing aircraft movement control. For aircraft flying longer distances in the objective area, the TAOC provides flight separation and airspace coordination information to ensure flight safety.

The TAOC coordinates with the DASC's on aircraft identification and radar handovers for ASRT's that control airdrops and provide other terminal control services. It controls aircraft initially entering the sector to participate in direct air support missions. Finally, the TAOC controls the conduct of air refueling operations assigned in support of other missions. Early warning and control (EW&C) sites function in a manner similar to that of the TAOC, but are more limited.

(3) Marine Air Traffic Control Squadron (MATCS).--The participation of the MATCS in the conduct of air reconnaissance missions is threefold. First, it is concerned with the launch of some air reconnaissance aircraft from ground alert status and provides for the aircraft safety associated with a "hot pad" of any type. Second, MATCS obtains fire support coordination information from the DASC to pass to aircraft under its control, either departing and returning aircraft, or aircraft for which it is providing flight following. Finally, the MATCS provides flight following and positive radar control as required for air reconnaissance missions operating within their control area.

(4) DASC.--The DASC is the central coordination agency for air reconnaissance and as such performs a number of functions. The DASC receives immediate requests from ground units directly and, if necessary, through the FSCC; it receives aircraft by category from the TACC/TADC for commitment to ground unit support; it coordinates with the TAOC for some en route aircraft; aircraft under its control are handed over to terminal control agencies for actual mission execution; it integrates air reconnaissance activity with the senior FSCC and provides designated MAGTF agencies with information on fire support coordination measures, restrictions, and controls; it directs and coordinates the employment of subordinate ASRT's; and finally, the DASC determines routes of approach and retirement for aircraft under its control.

(5) TACP.--The TACP is the agency representing ground elements in the air reconnaissance sequence of events. It forwards requests for air and controls aviation assets assigned to missions. It advises the ground element on the use, availability, and techniques/requirements to make the most economical use of air reconnaissance missions. It provides the aviation representation at various levels of FSCC's for coordination.

(6) TAC(A).--The TAC(A) may request and receive aircraft from the DASC for control as instructed by supported ground units or as prompted by the mission to which he is assigned. Further, the TAC(A), in conjunction with the HC(A), will act as a coordinator when fixed-wing and helicopter aircraft are operating in proximity and a ground controller is not available.

(7) HC(A).--The HC(A) assists the DASC or HDC in the coordination and control of helicopters. An HC(A) normally is utilized only for the initial assault and works closely with the TAC(A) to ensure coordination of helicopter movement with fixed-wing aircraft employment during combined fixed-wing and helicopter operations.

(8) Tactical Air Observer (TAO).--The TAO works in conjunction with the tactical air control and direction centers and other subordinate control agencies for controlling the tactical air observers. The TAO reviews airborne spot reports relative to the enemy situation and progress of friendly forces and relays this information to the respective tactical commander and the tactical air control and direction centers.

b. Antiair Warfare.--This topic is discussed in detail in FMFM 5-5, Antiair Warfare.

5304. AIRSPACE UTILIZATION

Airspace utilization is the degree of access to a block of airspace required to support a tactical mission. It is conditioned by the desired level of aircraft activity, the presence and capabilities of surface-based fire support means, airspace control requirements, and the assignment of priorities. Consequently, when airspace utilization is being planned, all significant uses of airspace over the combat area must be considered. For the amphibious assault operation, the joint force commander who orders the operation will assign, to the CATF, an airspace of defined proportions which will include the amphibious objective area. All operations in the AOA will be under the control of the CATF until the amphibious operation is terminated. To ensure unity of effort in overall air operations, the CATF will coordinate air operations within the defined airspace as necessary with the commander responsible for airspace control in the surrounding area.

a. Utilization Priorities.--The speed, range, and maneuverability of aircraft require centralization of control throughout the AOA. Yet, the ground commander's requirement for responsive fire support, specifically artillery and naval gunfire, necessitates the use of airspace that may conflict with aircraft operations. The CATF, in conjunction with the commander landing force, establishes force level priorities and general airspace control procedures. Subject to these procedures, MAGTF ground commanders are responsible for assigning immediate airspace utilization priorities within their area of responsibility. Airspace utilization requirements are coordinated with those of adjacent and high echelons.

b. Reassignment of Control.--At the termination of the amphibious assault operation, the amphibious task force will be dissolved, the assigned airspace will be disestablished, and the airspace control will normally revert to the airspace control authority designated for that area.

5305. AIR-GROUND COORDINATION

Fire support coordination is the planning and executing of fire so that targets are adequately covered by a suitable weapon or group of weapons. Its objectives are to assure that the most effective fire support is provided to all components participating in an operation, that adequate provisions for troop safety are made, that efforts are not duplicated, and that coordination with adjacent and higher units prevents mutual interference. Early in the planning stages of an operation, representatives of the various fire support means (artillery, naval gunfire, and air) begin examining known and anticipated targets. Their purpose is to determine the most economical yet efficient means to achieve the desired effect on each target. They attempt to distribute fire support to all participating ground combat elements according to predetermined priorities, yet maintain enough flexibility to meet the demands of developments. Pre-D-day and pre-H-hour naval bombardment, airstrikes, and beach strafes are planned to offset the vulnerabilities of assault elements prior to artillery coming ashore. Once ashore, as the landing force pushes inland to the limits of naval gunfire ranges, artillery support receives heavier emphasis. Another complex task exists for fire support coordination planners and that is to ensure the delivery of fire support without endangering friendly forces. This necessitates provisions for avenues of movement for the air reconnaissance aircraft throughout the operation. This is a particularly difficult task when aircraft are widely scattered in the performance of logistic support tasks.

a. Coordination of Air Reconnaissance With Other Fire Support Means.--The characteristics of aircraft, particularly their mobility, require that specific attention be given to their integration with other air support means. The activity of these aircraft must be coordinated with other air activity to meet force priorities and safety requirements. The problems created by aircraft speed and movement necessitates control being centralized at the highest level of the MAGTF. This centralization is required to ensure economical use of resources and to provide flexible response for the entire MAGTF ground combat element. Centralization of control dictates a process wherein air reconnaissance is requested from a central, functional, control agency. Immediate and on-call requests to the DASC are screened by intermediate ground command echelons for approval. The significance of this requesting procedure is that each intermediate echelon must examine the location and status of any artillery or naval gunfire missions in progress and look carefully for any other threat to aviation within their area of responsibility. The process of approval allows higher echelons the opportunity to disapprove when more pressing requirements for air reconnaissance support exist elsewhere or when higher priority fire missions would have to be either checked or terminated in order to accomplish the requested air mission. Provisions are established within each MAGTF to ensure flexibility and rapid integration of air with other supporting arms. In order to accommodate this function, a specific agency has been established within the MAGTF structure where all supporting arms activity is centrally reviewed, approved, coordinated, and displayed. Furthermore, general control measures are employed which allow rapid and effective coordination when necessary.

(1) Fire Support Coordination Center.--The various FSCC's are the commander's agencies tasked to stay abreast of the supporting arms effort and to perform the necessary coordination. They are the only agencies which combine the communications and personnel needed to plan, receive, process, implement, and forward information concerning artillery, air, and naval gunfire activity. The FSCC is a staff agency at each level of infantry command from the battalion through the command element of the largest MAGTF, the Marine amphibious force. Staffed by representatives of each of the supporting arms, FSCC personnel are closely attuned to the intentions of the commander and represent his interests in fire coordination matters. For decisions beyond their assigned responsibility, they establish immediate contact with the commander. They consolidate the summary information on supporting arms activity and assign the necessary control measures for continuous fire support.

(2) Coordination and Control.--Coordination and control measures set forth responsibility, restrict and control fires, and complement the effort of higher and adjacent units. Aircraft are subject to limitions in the execution of their missions in much the same manner as ground units. In the case of assault support operations, the fire support coordination line (FSCL) and suppression of enemy air defenses (SEAD) requirements are of the greatest concern and importance. These measures ensure that the ground commander maintains airspace utilization approval authority over his immediate airspace and that safety requirements for both aircraft and ground forces are met.

(a) Fire Support Coordination Line.--The FSCL is a boundary short of which aircraft do not attack ground targets, except on the request and/or approval of the appropriate ground commander. Beyond the FSCL, aircraft may attack targets without specific clearance from ground commanders. The FSCL is ideally located at the extreme ranges of artillery and naval gunfire. Inside the FSCL, coordination with other supporting arms is obviously necessary, and attack of targets must be coordinated with the appropriate ground commander. As a fire coordination control means, it serves the following two purposes:

1 Provides ground commanders with sufficient control of aircraft to assure troop safety, aircraft safety, and coordination of airstrikes with ground maneuver. It additionally precludes the unnecessary duplication of supporting fires.

2 Provides aviation commander, air control agencies, and pilots of aircraft with sufficient information to clearly delineate the degree of control or coordination required for aircraft to attack ground targets or conduct flight operations in the area.

(b) Airspace Coordination Area.--The ACA is a block of airspace in the target area in which friendly aircraft are reasonably safe from friendly surface fires. It may occasionally be a formal measure (a three-dimensional box in the sky). Information included in dissemination, if a formal measure, will provide minimum-maximum altitude, length (two coordinates), width, and effective date-time group (DTG). (See fig. 21.)

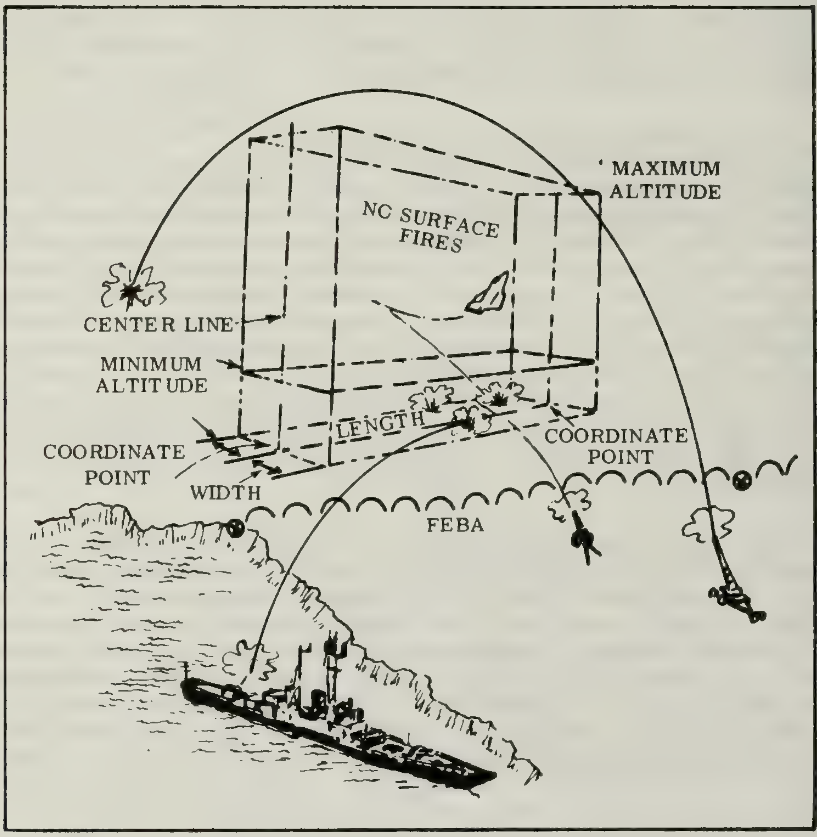


Figure 21.--View of Typical Airspace Coordination Area.

(c) SEAD Techniques.--SEAD techniques are closely related to counterbattery fires and are employed in support of hostile antiaircraft weapons that can fire on air reconnaissance aircraft during the execution of their missions. SEAD fires are primarily delivered by artillery units; however, naval gunfire and support aircraft may be employed in this effort. Because of the detailed and close coordination required, SEAD fires are planned, coordinated, and controlled by the appropriate FSCC. The aviation representative in the FSCC plays a most important part in the planning of these missions. He is responsible for the preparation and use of SEAD templates that represent the area and time each type of aircraft will be vulnerable to antiaircraft fires during certain types of missions. The key to a successful SEAD mission lies in thorough planning and positive control of its execution. The SEAD mission is controlled directly by the forward air controller, forward observer (FO), and/or when naval gunfire is utilized, by the shore fire control party (SFCP). These controlling agencies can be located side by side in an observation post or tied together with "hot lines" to ensure instant reaction. When aircraft are used in SEAD roles, control is provided by a TAC(A) or FAC.

5306. FIRE MISSION CONTROL AGENCY COORDINATION

Due to the flexibility and capabilities of MACCS agencies, strict adherence to fixed areas of responsibility is not always applicable. As noted, these agencies perform cross-functional services and are assigned missions according to their abilities. Another major employment consideration is that required coordination must not be omitted by procedural oversight or variance from common practice. Such oversight has been experienced and is identified herein. There are missions in all of the aviation functions which could be directed outside, but in relative proximity to a ground commander's airspace boundaries. These missions would be directed by the MAGTF commander in support of the total landing force and fire support coordination measures and have not been previously addressed.

b. Fire Coordination Beyond the FSCL.--Past definitions of the FSCL have placed no restriction on, or requirement for coordination of, any surface fires impacting beyond the FSCL. By previous definition, surface fires could be traversing or initiating in a ground commander's airspace (as defined by the FSCL) without a formalized requirement for coordination, if impact was beyond the FSCL. The potential hazard that this presents to aircraft operations inside that airspace is apparent. There is an equal hazard, perhaps greater, to aircraft operating in proximity to the FSCL, but not inside it. It has been stated that the FSCL will "ideally" be at the limit of friendly surface fire capability, but in fluid combat situations, particularly amphibious operations, this may be an unrealistic expectation. Similarly, there may be other surface fire or friendly aircraft activity which does not employ the ground commander's airspace, but which does use airspace adjacent to the FSCL. This activity presents potential hazards to MAGTF air reconnaissance operations. Joint task force (JTF), amphibious task force, or the MAGTF itself may all have targets designated in these areas. Air and ground reconnaissance, indigenous friendly force activity, interdiction, or offensive antiair warfare (AAW) operations are examples of such missions which could be reasonably anticipated. Previous FSCL definitions have not provided for the safety of aircraft employed in proximity to these activities. The requirement exists to ensure coordination regardless of the source of the activity or location of the target, if hazards to aircraft operations are involved. During those phases of the amphibious operation when control remains afloat, this coordination is provided by the tactical air control center/supporting arms coordination center (TACC/SACC) afloat. As control phases ashore, coordination inside the FSCL becomes the responsibility of the DASC and the senior ground combat element FSCC. Coordination beyond the FSCL is retained afloat. FSCL's, however, are normally not established by the MAGTF, rather they are designated by the ground combat element. Additionally, for larger size MAGTF's, there is often no fire support coordination agency at the force level. As a result, once full control is passed ashore, the coordination capability previously provided by the TACC/SACC afloat may be overlooked and lost. To overcome this loss, the ground combat element FSCC may be tasked to coordinate all surface fires which use any airspace in the MAGTF area of responsibility, regardless of its relationship to the FSCL. This solution is reasonable only if responsibility is assigned to that FSCC to coordinate all surface fires within assigned airspace and within surface fire unit maximum range and ordinate capabilities. In this instance, the DASC may be assigned the aircraft hazard advisory/coordination task. Regardless of the methods employed, aviation commanders must ensure that air and ground fires beyond the FSCL are coordinated in such a manner that provides for the safety of their aircrews and aircraft.

c. Control Agency Capabilities.--Another factor which influences the use of air control agencies is their ability to function in that capacity. As in the preceding discussion, the situation may arise wherein any agency directly supporting ground units may be employed in support of the entire MAGTF. For example, the ASRT offers the capability for all-weather, radar controlled bombing. It is routinely assigned to the DASC for direction and operates primarily in support of the ground combat element. Yet, its basic radar capability and the range at which it can operate makes it valuable as a means to support the entire MAGTF, regardless of its capabilities relative to an FSCL. It can be tasked to periodically control missions in direct support of the MAGTF according to appropriate priorities. If inside the FSCL, the DASC will provide the necessary supporting arms coordination. If not, and depending upon the responsibilities of the senior FSCC, either the TADC/TACC or the DASC may perform this coordination. The two significant factors are that the air coordination beyond the FSCL is the responsibility primarily of the TACC and that the basic capabilities of the air control agency, not the formal organizational structure, dictates the employment method for that agency.

5307. AUTOMATED AND MANUAL SYSTEM COORDINATION

The Marine air command and control system is in the evolutionary process of changing from manual to automated systems. Since the change is not fully effected as yet, a requirement exists for coordination measures to interface the manual and automated processes. Additionally, plans must incorporate manual procedures to be employed, should automated systems failure occur. Specific methods are not addressed in this manual, rather they must be developed to reflect the personnel and equipment employed at each force level.

Section IV. COMMUNICATIONS-ELECTRONICS

5401. GENERAL

In order to accomplish air reconnaissance tasks, multiple communication assets are required to support the MAGTF. Although good organization is important for effective control of aerial reconnaissance, the availability of reliable and sophisticated equipment is vital. The key element in the functioning of the total system is rapid and reliable communications. In fact, a large part of mission success depends upon the effectiveness of the communication facilities established. Communication requirements required for the MAGTF are set forth in FMFM 10-1, Communications.

5402. REQUIREMENTS

An effective exchange of information between the ground and air elements of the MAGTF is vital to the air reconnaissance role. Because there are many functions within Marine aviation involving ground and air coordination, many communication nets are required to provide the vehicles for exchanging information. If air reconnaissance is to be responsive, both the air and ground commanders must have a thorough knowledge of the communication nets needed and how they should be used. For detailed information concerning communications, consult FMFM 10-1, Communications.

a. Needs of the Ground Commander for Aerial Reconnaissance Support.--The ground commander has four communication net requirements. They are the tactical air request (TAR) net, the helicopter request (HR) net, the tactical air observation (TAO) net, and the tactical air control party (TACP) local net.

(1) Helicopter Request Net

(a) Purpose.--The HR net provides a means for the tactical air control parties of helicopterborne units, and those units assigned on-call helicopters, to request immediate helicopter support from the DASC or HDC. Surface-landed units submit request for immediate helicopter support to the DASC or TACC (afloat) via the TAR net. Preplanned helicopter support for helicopterborne and surface-landed units will be submitted via command channels.

(b) Composition

1 DASC.
2 TACC/HDC.
3 TACP's of helicopterborne units.

(2) Tactical Air Request Net

(a) Purpose.--The TAR net provides a means for forward ground combat units to request immediate air support from the DASC. Intermediate ground combat echelons monitor this net and may modify, disapprove, or approve a specific request. The DASC uses the net to brief the requesting unit on the details of the mission. Additionally, target damage assessments and emergency helicopter requests may be passed over this net. Multiple TAR nets may be required depending on the scope of close air support operations.

(b) Composition

1 DASC.
2 TACP's.
3 ASRT (when directed or as required).

(3) Tactical Air Observation Net

(a) Purpose.--The TAO net provides a means for the tactical air observer to report action observed, information on the enemy situation, and the progress of friendly forces.

(b) Composition

1 TACC/TADC.
2 DASC.
3 Tactical air observers.
4 Ground units (when directed or as required).

(4) Tactical Air Control Party Local Net

(a) Purpose.--The TACP local net provides a means for coordination between the air officer and the forward air controllers.

(b) Composition

1 Air officer.
2 Forward air controllers.

b. Needs of the Air Commander to Support Ground Units in the Air Reconnaissance Role.--Once the requirement for air reconnaissance has been established through the TAR or HR nets, the air commander must have a vehicle to process the request and control the aircraft assigned to the mission.

(1) Requesting Direct Air Support.--The request for DAS is accomplished through the tactical air command net. It is activated by the TACC and will be used to procure the assets to meet the requirements of the ground commander.

(2) Controlling Air Reconnaissance Aircraft.--The aircraft obtained for the air reconnaissance mission report in to the DASC via the tactical air traffic control (TATC) net. The pilot/AO must have the necessary information to perform the assigned mission. This information usually includes navigational information, brief of the situation in the assigned area, ground unit to contact on what radio frequency, and tactical air direction (TAD) net to monitor sortie.

(3) Nets Available to Air Reconnaissance.--(See fig. 22.) While the RF-4, flying the multisensor imagery mission, and the EA-6, flying the electronic mission, normally only utilize the TATC net to report in and out (RIO) with the DASC, the Marine air observer may utilize many nets during the course of one sortie to carry out his mission. An example of nets that can be utilized are listed below:

(a) TATC net: RIO.

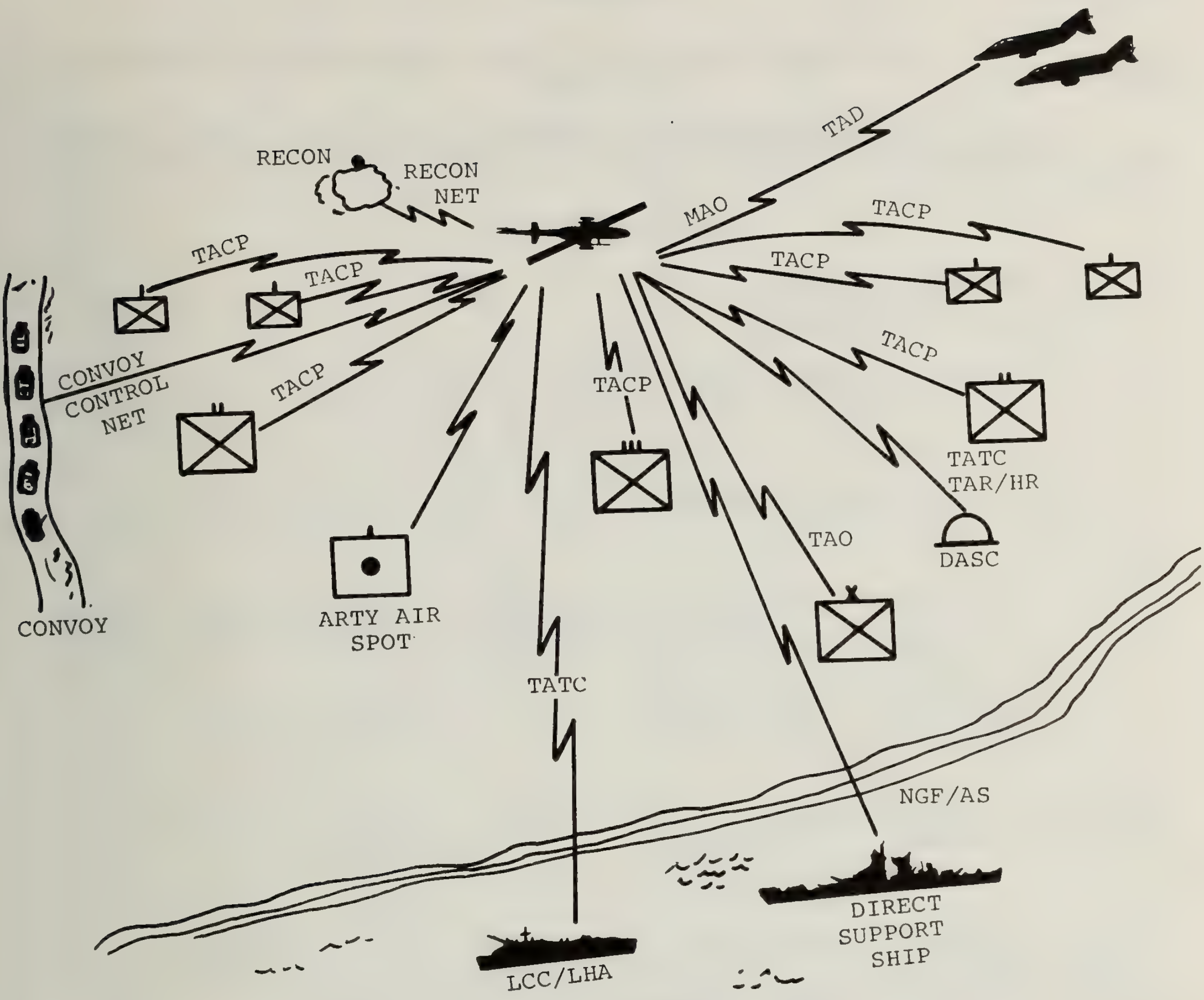


Figure 22.--Air Reconnaissance Nets.

(b) TAR net: Request close air support.

(c) TACP net: Coordinate mission with ground unit.

(d) Recon TAC net: Assist recon team.

(e) Artillery air spot net: Control and adjust artillery.

(f) NGF air spot net: Control and adjust naval gunfire.

(g) TAD net: Control close air support.

(h) TAO net: Report and receive information of immediate value.

(i) Convoy control net: Help provide security for motor march routes.

(j) Any net HF, UHF, VHF/FM: Provide radio relay for any unit, both ground and air.

APPENDIX A

FORMAT FOR VISUAL AERIAL RECONNAISSANCE AND SURVEILLANCE PLAN

CLASSIFICATION

Issuing headquarters
Place of issue
Date/time of issue

Appendix (Number) (Visual Aerial Reconnaissance and Surveillance Plan) to Annex (Letter) (Intelligence) to Operation Order (Number)

Ref: (a) Maps and photographs as required.

1. The following visual aerial reconnaissance and surveillance missions have been preplanned:

Mission No.	Area, Specific, of Route Search	Type of Aircraft	Frequency & Duration	Remarks
1	Area (________ to __________ to __________ to __________)	VMO	Daily, commencing D-day - BMNT to EENT	Report every activity as obtained.
2	Route (Rt 134 from __________ to __________)	VMO	Daily, commencing D-day. Once an hour, BMNT to EENT	Report enemy movements.
3	Specific (Middletown)	High Performance	Daily, commencing D-2. Once every 4 hours, BMNT to EENT	Report activity as obtained, with emphasis on Hq. 8th Mtz Rifle Div.

Signature

Name
Rank and Service
Commanding

(Or) BY COMMAND OF. . . Rank and Name

Signature

Name
Rank and Service
Chief of Staff
or
Executive Officer

CLASSIFICATION

APPENDIX B

AERIAL IMAGERY PLAN

45TH MARINE AMPHIBIOUS BRIGADE
CAMP ANYWHERE, USA
012300Z JANUARY 19XX

TAB B (AERIAL IMAGERY PLAN) TO APPENDIX 8 (RECONNAISSANCE AND SURVEILLANCE PLAN) TO ANNEX B (INTELLIGENCE) 45TH MAB OPLAN 1-XX

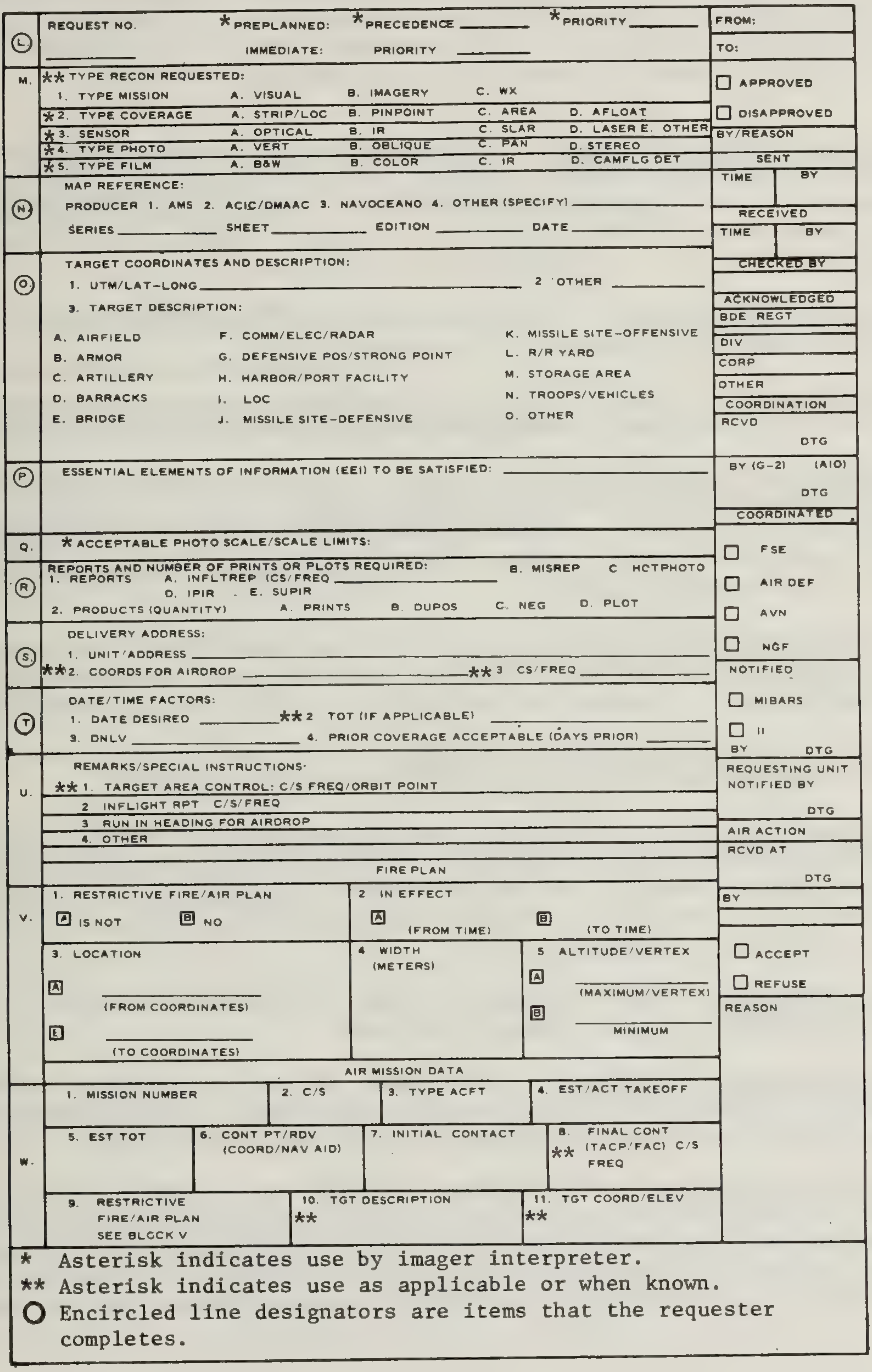
REF: (a) 5TH MARDIVO P3800.3_

1. Preplanned Missions. The following missions are approved for execution on order. Requests for additional missions will be submitted in accordance with reference (a).

MSN NO	UTM COORD	VERT OBL PAN	OVERLAP	FILM AND SCALE	SLAR MODE	IR	D-60	D-30	D-20	D-10	D-5	D-3	D-1	D	D+1	D+2	D+3	REMARKS
1	11S NJ 810904 TO NJ 490411	30° OBL KS-87 PAN KA-82	56%	STRIP B/W 1:25,000	NO	NO	X			X			X					COASTAL RECON
2	11S NH 879801 TO NJ 731800	30° OBL KS-87 PAN KA-82	56%	STRIP B/W 1:25,000	NO	NO		X		X			X					COASTAL RECON
3	11S NJ 681711 TO NJ 523882	30° OBL KS-87 PAN KA-82	56%	STRIP B/W 1:15,000	NO	NO			X		X		X					COASTAL RECON
4	11S NJ 720000 TO NJ 750260	30° OBL KS-87 PAN KA-82	56%	STRIP B/W 1:15,000	NO	NO						X						COASTAL RECON
5	11S NJ 810904 TO NJ 490411	FWD OBL VERT KS-87	56%	STRIP COLOR 1:7,500	MTI	NO					X							BEACH SURF RECON
6	11S NJ 123456 TO NJ 789101	VERT KS-87	56%	STRIP CDIR 1:5,000	MTI	NO								X	X	X	X	PSNS LOC VEH ACT
7	11S NJ 354211 777777 811881	VERT KS-87	56%	PINPOINTS B/W, CDIR 1:10,000	NO	NO						X		X				HLZ GOOSE DUCK PENGUIN
8	11S NK 126211 TO NR 611223	FWD OBL VERT KS-87	12%	STRIP COLOR 1:15,000	NO	YES					X		X					LABS ROUTE RECON

APPENDIX C

JOINT TACTICAL RECONNAISSANCE/SURVEILLANCE REQUEST FORM



Ⓛ REQUEST NO. _____ *PREPLANNED: *PRECEDENCE _____ *PRIORITY _____
IMMEDIATE: PRIORITY _____

M. **TYPE RECON REQUESTED:
1. TYPE MISSION A. VISUAL B. IMAGERY C. WX
*2. TYPE COVERAGE A. STRIP/LOC B. PINPOINT C. AREA D. AFLOAT
*3. SENSOR A. OPTICAL B. IR C. SLAR D. LASER E. OTHER
*4. TYPE PHOTO A. VERT B. OBLIQUE C. PAN D. STEREO
*5. TYPE FILM A. B&W B. COLOR C. IR D. CAMFLG DET

Ⓝ MAP REFERENCE:
PRODUCER 1. AMS 2. ACIC/DMAAC 3. NAVOCEANO 4. OTHER (SPECIFY) _____
SERIES _____ SHEET _____ EDITION _____ DATE _____

Ⓞ TARGET COORDINATES AND DESCRIPTION:
1. UTM/LAT-LONG _____ 2 OTHER _____
3. TARGET DESCRIPTION:

A. AIRFIELD
B. ARMOR
C. ARTILLERY
D. BARRACKS
E. BRIDGE
F. COMM/ELEC/RADAR
G. DEFENSIVE POS/STRONG POINT
H. HARBOR/PORT FACILITY
I. LOC
J. MISSILE SITE-DEFENSIVE
K. MISSILE SITE-OFFENSIVE
L. R/R YARD
M. STORAGE AREA
N. TROOPS/VEHICLES
O. OTHER

Ⓟ ESSENTIAL ELEMENTS OF INFORMATION (EEI) TO BE SATISFIED: _____

Q. *ACCEPTABLE PHOTO SCALE/SCALE LIMITS:

Ⓡ REPORTS AND NUMBER OF PRINTS OR PLOTS REQUIRED:
1. REPORTS A. INFLTREP (CS/FREQ _____ B. MISREP C HCTPHOTO
D. IPIR E. SUPIR
2. PRODUCTS (QUANTITY) A. PRINTS B. DUPOS C. NEG D. PLOT

Ⓢ DELIVERY ADDRESS:
1. UNIT/ADDRESS _____
**2. COORDS FOR AIRDROP _____ **3 CS/FREQ _____

Ⓣ DATE/TIME FACTORS:
1. DATE DESIRED _____ **2 TOT (IF APPLICABLE) _____
3. DNLV _____ 4. PRIOR COVERAGE ACCEPTABLE (DAYS PRIOR) _____

U. REMARKS/SPECIAL INSTRUCTIONS·
**1. TARGET AREA CONTROL: C/S FREQ/ORBIT POINT
2 INFLIGHT RPT C/S/FREQ
3 RUN IN HEADING FOR AIRDROP
4. OTHER

FIRE PLAN

V.
1. RESTRICTIVE FIRE/AIR PLAN 🄰 IS NOT 🄱 NO
2 IN EFFECT 🄰 (FROM TIME) 🄱 (TO TIME)
3. LOCATION 🄰 _____ (FROM COORDINATES) 🄱 _____ (TO COORDINATES)
4 WIDTH (METERS)
5 ALTITUDE/VERTEX 🄰 _____ (MAXIMUM/VERTEX) 🄱 _____ MINIMUM

AIR MISSION DATA

W.
1. MISSION NUMBER
2. C/S
3. TYPE ACFT
4. EST/ACT TAKEOFF
5. EST TOT
6. CONT PT/RDV (COORD/NAV AID)
7. INITIAL CONTACT
8. FINAL CONT (TACP/FAC) C/S FREQ **
9. RESTRICTIVE FIRE/AIR PLAN SEE BLOCK V
10. TGT DESCRIPTION **
11. TGT COORD/ELEV **

FROM:
TO:
☐ APPROVED
☐ DISAPPROVED
BY/REASON
SENT
TIME BY
RECEIVED
TIME BY
CHECKED BY
ACKNOWLEDGED
BDE REGT
DIV
CORP
OTHER
COORDINATION
RCVD DTG
BY (G-2) (AIO) DTG
COORDINATED
☐ FSE
☐ AIR DEF
☐ AVN
☐ NGF
NOTIFIED
☐ MIBARS
☐ II
BY DTG
REQUESTING UNIT NOTIFIED BY DTG
AIR ACTION
RCVD AT DTG
BY
☐ ACCEPT
☐ REFUSE
REASON

* Asterisk indicates use by imager interpreter.
** Asterisk indicates use as applicable or when known.
○ Encircled line designators are items that the requester completes.

INSTRUCTIONS FOR COMPLETING JOINT TACTICAL AIR RECONNAISSANCE/SURVEILLANCE REQUEST FORM

(NOTE: The following format has been published as STANAG/SEASTAG No. 3277 and has been approved by NATO and SEATO nations as a standard format for aerial reconnaissance request. The letters A to K have special significance for certain organizations and are purposely omitted.)

L. Originator's Serial Number. Use words "Air Reconnaissance Request" followed by originator's serial number. Each request will be given a serial number consisting of a prefix followed by a number commencing with 001-XX and running consecutively throughout the year. Prefixes will be the headquarters requesting; e.g., 3d MarDiv, 2d MAW, etc.

M. Type of Reconnaissance. This section will be completed by the imagery interpretation units supporting the requester.

N. Map Reference. Owing to the large variety of maps used both in training and operations by nations, these details must be given in full.

O. Description of Target and Location. So as to leave the recipient of the request in no doubt as to the requirements, it is necessary to give an exact location; e.g., railway bridge UV775386. If grid reference is used, state grid type; i.e., UTM, GEOREF, etc., otherwise state latitude and longitude to the nearest minute.

P. Essential Elements of Information. It is important that the exact purpose of the request is stated in order that the most satisfactory results may be produced; i.e., vehicular activity at night along Route 101.

Q. Acceptable Photo Scale/Scale Limits. This section will be completed by the imagery interpretation unit supporting the requester.

R. Reports and Number of Prints or Photos Required. This should never exceed the number actually required. If a photo interpretation report will suffice, prints should not be ordered; however, if prints are requested, the requester will specify if he desires annotation of each print with location and orientation information.

S. Delivery Address. State clearly where the prints, plots, or reports are to be delivered and the contact officer.

T. Latest Acceptable Time/Date. The date and/or time after which the prints, plots, or reports are no longer required. If delivery cannot be made by the date requested, the request will be cancelled.

U. Special Instructions. The degree of urgency or, when making more than one request, the degree of priority and the security of classification of material requested. Note whether photo interpretation is desired from the photographs. Give any instructions or information not already provided that will aid the planning or successful accomplishment of the mission.

SAMPLE MESSAGE FORMAT

FM: CO, 8TH MAR REGT

TO: CG, 2D MAR DIV

BT

CLASSIFICATION//NO3822//

AERIAL RECON REQUEST

L. 8TH MAR 001-74

N. 1, V742, 553III, ED3, 1969.

O. UTM 18SUP962402 to 18SUP962608.

P. DETECT ENEMY VEHICULAR TRAFFIC ON HWY 101.

R. 1A, 1D, 2A1.

S. HLZ18SUP022402, 8TH MAR REGT, CAPT JOHNSON.

T. 1, 120233ZFEB77, 3, 1305332FEB77

BT

APPENDIX D

SAMPLE FORMATS FOR REQUEST AND REPORTS

Form	Page
Request for Tactical Air Observation Support	122
Helicopter Landing Area Reconnaissance Report	123
Urban Area Reconnaissance Report	124
Road Reconnaissance Report	126
Bridge Reconnaissance Report	127
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Railroad Reconnaissance Report	129
SALUTE Report Format	130

SAMPLE REQUEST FOR TACTICAL AIR OBSERVATION SUPPORT

27TH MARINE REGIMENT
5th Marine Division (-)(Rein), FMF
Camp Pendleton, California 92055

Date: 1 February 19XX

From: Commanding Officer
To: Commanding General (DIVAIRO), 5th Marine Division (-)(Rein), FMF

Subj: Request for Air Observation Support

Ref: (a) FMFM 5-6

FOR FIELD USE ONLY
ADDRESSEE: (CALL SIGN) (THIS IS: CALL SIGN)
1. Mission: A. Immediate B. Preplanned C. Unit Training X
2. Map: A. AMS V795 California 1:50,000 Sheet 2550 IV
3. Surveillance: Las Pulgas Canyon Between Basilone Road and Beach - (Boundaries) (Time Limits) 1700-1830
4. Reconnaissance:
    A. Area (Boundaries) N/A (Times)
    B. Specific (Coordinates) N/A
    C. Route (From) 575846 (To) 623898
    D. Contact (Unit) H-3-27 (Coord) 618891 (Time) 1716 15FebXX
5. Supporting Arms: N/A A. Arty Air Obs B. NGF Air Spot C. FAC(A)
6. Special: A. Comm Relay B. Movement Cover
    C. Helicopter Escort D. Other
7. Mission Objective: To maintain surveillance of Las Pulgas Canyon and conduct route reconnaissance of the Las Pulgas road at dusk.
8. Execution: A. DTG support is desired: 18 1700-1830 Feb 19XX
    B. DTG support value is lost: 18 1800 Feb 19XX
9. Liaison: A. Is not required B. Is required
    C. Liaison contact is: Requesting Unit
10. Coordinating Instructions:
    Friendly troops in outpost at 622875
    Friendly roadblock at 612883

SAMPLE HELICOPTER LANDING AREA RECONNAISSANCE REPORT

To: 27th Marines (Requesting Unit) Date: 1 Feb XX

A. DTG of Mission: 010940U Feb XX

B. Sketch, Photo, or Overlay of Area Enclosed: (Yes) X (No) ___

C. Map: AMS V795 Calif 1:50,000 Sheet: 2550 IV

D. Center Coordinates: MG625846

E. Helicopter Landing Area (Zone, Site, Point): Site

F. Classification of Area (Excellent, Good, Fair, or Reject): Good

G. Dimensions of Area: Length 400M Width 200M

H. Concealment (Available to Enemy and/or Friendly): Entire site surrounded by trees and brush to 7'. Good for enemy/fair for friendly.

I. Avenues of Approach (Evaluation/Coordinates):

1. Resupply: Good/626850/620848
2. Linkup: Good/626850/620848
3. Barriers: Bridge at 620852

J. Distance to Primary Objective: 900M

K. Soil Condition: Light dust

L. Ground Obstacles: Dead trees east of site

M. Approach and Departure Obstacles: Sufficient glide path

N. Water: Stream at 620854

O. Slope: Approx 15°

P. Navigation Aids:

1. Fork in road at 628854.
2. Pond at 621844.

Q. Wind Encountered: 240/15K

R. Evasion and Pickup Points: 615842/627852

S. Routes to Friendly Area: Road SW 620848

Air Observer: R. GREEN, CAPT, USMC
VMO-2

SAMPLE URBAN AREA RECONNAISSANCE REPORT FORM

Date: 26 Jan XX

1. Requesting Unit: 27th Marines
2. Date/Time of Mission: 261004JanXX
3. Map: AMS V795 Calif 1:50,000 Sheet 2550IV
4. Grid Squares Covered: 18
5. Approx. Population of City: 1500
6. Main Industry: Fishing
7. Secondary Industries: UNK
8. No. of City Blocks Reconnoitered: 14
9. Approx. Square Miles of City: 2
10. Avenues of Approach: 6712 from S., 8210 from N., 9785 from E.
11. Power Stations (coord): MG90817621
12. Bridges: MG90701843 MG89183690
13. Fuel Pumps (coord): MG76819231
14. Radio Stations (coord): N/A
15. Crops: N/A
    Storage At: N/A
16. Engineering Material At: MG73828391
17. Piers (coord): MG76217553
18. Hospitals (coord): N/A
19. Factories (coord): Canning Factory MG75717682
20. Airports (No. of Runways, Length of Runway and Direction): N/A
21. Schools (coord): MG78507721
22. Water Supply (coord): MG81607521
23. Photographs Taken:
    Camera: KB-51A
    Film: 400 ASA
    Number: 10
    Type: Low Obliques
24. Railroads From: N/A
    To:
    From:
    Sidings At:
    Junction:
25. Dump Sites/Warehouses At (Specify): N/A
26. Obstacles:
    Natural From MG3521 To MG7631
    From To
    Manmade From MG8052 To MG8557
    From To
27. CP Locations At: N/A
28. OP Locations At: N/A
29. Enemy Strongpoints At: MG8052 to MG8557
30. Bivouac/Billeting Areas At: N/A
31. Landing Strips At: N/A
32. Helicopter Landing Sites At: MG74418051
33. Traffic Control Points At: MG75517432
34. Wheeled/Tracked Vehicles Parks At (Specify Type): MG78327156 Truck to 5 T
35. Arty Parks At (Specify): N/A

36. AAA Positions At: N/A

37. Remarks: Trench lines appear throughout area

Air Observer: W. M. BROWN, MAJ, USMC
VMO-2

SAMPLE ROAD RECONNAISSANCE REPORT

DATE: 18 Jan 19XX

1. Requesting Unit: 27th Marines
2. Date/Time of Mission: 170800UJanXX
3. Map: a. Name: Margarita Peak b. Scale: 1:50,000 c. Sheet No: 2550 IV
4. Coordinates:
   From: MG723820 To: MG713860
5. Direction of Road:
   N - S ______ NE - SW ______
   E - W NW - SE
6. Number of Lanes: 4
7. Width of Roadway (Feet): 44
8. Length of Roadway (Miles): 3
9. Alignment (check one):
   a. Flat Gradients and Easy Curves
   b. Steep Gradients
   c. Sharp Curves
   d. Steep Gradients and Sharp Curves X
10. Drainage (check one only):
    a. Adequate ditches, crown with adequate culverts in good condition. X
    b. Inadequate ditches, crown, or culverts (list location of inadequate conditions under remarks).
11. Type of Surface (check one):
    a. Concrete
    b. Asphalt
    c. Brick
    d. Stone
    e. Crushed Rock or Coral
    f. Macadam
    g. Gravel X
    h. Natural Soil, Clay, Shell, or Cinders
    i. Other (Describe)

12. Surface Condition (check one):
    a. Free of craters, bumps, ruts
    b. Cratered, bumpy ruts

13. Turn-a-Rounds (single lane road only::

a. Nature	b. Location
N/A	

14. Obstructions: N/A
    a. Overhead clearance less than 14 feet such as tunnels, bridges, overhead wires, etc.

(1) Description	(2) Location
Power lines	MG709846

15. Bridges, Fords, and Ferries: (See attached bridge report)
    a. Condition: Good b. Location

16. Area Under Repair or Needing Repair:

a. Why	b. Location
Minor road repair	MG709837

17. Repair Materials Available:

a. Type	b. Location
Bricks and Lumber	MG718471

18. Remarks
    Low areas appear subject to flooding.

Air Observer: P. L. WHITE, CAPT, USMC
VMO-2

SAMPLE BRIDGE RECONNAISSANCE REPORT

DATE: 6 Feb 19XX

1. Requesting Unit: 28th Marines
2. Date/Time of Mission: 061315FebXX
3. Map: a. Name b. Scale c. Sheet No. of Map
   Margarita Peak 1:50,000 2550 IV
4. Type of Bridge:
   Highway: X Railroad: Foot:
5. Coordinates (from center of bridge): MG472978
6. Direction of Bridge (check one):
   a. N-S X b. E-W c. NE-SW d. NE-SE
7. Crossing (name of geographical feature if known):
   San Onofre Creek
8. Location From Nearest Town:
   a. Distance: 3000 Meters
   b. Direction: NW
   c. Name of Town: San Clemente
9. Roadway Width: 20 Ft.
10. Bridge Width: 25 Ft.
11. Height of Handrail: 3 Ft.
12. Length of Bridge: 120 Ft.
13. Type of Bridge:
    a.Truss e.Suspension i.Steel Stringer
    b.Draw f.Concrete Slab X j.Military
    c.Arch g.Floating (Aluminum or
    d.Wooden Stringer h.Swing Steel)
14. Number of Spans: 2
15. Length of Spans: 60 Ft.
16. Type of Spans:
    a. Simple X b. Continuous
17. Condition of Superstructure (check one):
    a. Excellent c. Fair
    b. Good X d. Poor
18. Type Intermediate Supports (check one):
    a. Trestle Bent e. Simple Pile X
    b. Pile Bent f. Crib Pier
    c. Trestle Pier g. Concrete Pier
    d. Pile Pier h. Others (Specify)
18a. Material Intermediate Support is Constructed of:
    a. Wood b. Steel c. Concrete X

19. Intermediate supports have protecting fenders (check one):
    a. Yes b. No X
20. Condition of Superstructure (check one):
    a. Excellent c. Fair
    b. Good X d. Poor
21. Type Abutment:
    a. Simple Abutment X
    b. End-Dam
    c. U-Shaped Abutment
    d. Box-Shaped Abutment
    e. Winged Abutment
    f. Others (Specify)
21a. Material Abutments are Constructed of:
    a. Wood c. Rock
    b. Concrete X d. Dirt
22. Overhead Clearance (Feet): N/A
23. Height Above Water: 10 Ft.
24. Width of Stream: 80 Ft.
25. Depth of Water (Estimate): 2 Ft.
26. Direction of Water Moving: W
27. Type of Banks:
    a. Height: 8 Ft. b. Slope: 45 Degrees c. Material: Dirt
28. Fordable by Tracked Vehicles:
    a. Yes X b. No
29. Fordable by Wheeled Vehicles:
    a. Yes b. No X
30. Bypass Information (Possible Bypass):
    100 Meters West
31. Sketch Top View, Side View, and Cross Section of Bridge on Back (Include Approaches): See attached sketch.
32. Remarks:
    N/A

Air Observer: R. J. BLACK, CWO-3, USMC
VMO-2

SAMPLE CULVERT RECONNAISSANCE REPORT

DATE: 14 Jan 19XX

Requesting Unit: 27th Marines
Date/Time of Mission: 141000UJanXX
Map: AMS V795 California 1:50,000 Sheet: 2550 III

TYPE	LOCATION	MATERIAL	LENGTH	DIAMETER	CONDITION	REMARKS
Full Round	MG72318205	Cement	45'	3'	Good	---
Box	MG72808016	Wood	25'	4'	Poor	---

Air Observer: J. J. GRAY, CWO-3, USMC
VMO-1

SAMPLE RAILROAD RECONNAISSANCE REPORT

DATE: 15 Jan 19XX

1. Requesting Unit: 27th Marines

2. Date/Time of Mission: 151000UJanXX

3. Map: a. Name: Margarita Peak b. Scale: 1:50,000 c. Sheet No. of Map: 2550 IV

4. Coordinates:
From: MG64907890 To: MG76409340
From: To:

5. Direction of Tracks (check one):
a. N-S X b. E-W c. NE-SW d. NW-SE

6. Gauge of Track (check one):
a. Narrow Gauge
b. Standard Gauge X

7. Number of Tracks: 1

8. Condition of Tracks (check one):
a. Excellent c. Fair
b. Good X d. Poor

9. Roadbed Material (check one):
a. Crushed Rock X
b. Other (Specify)

10. Condition of Roadbed (check one):
a. Excellent c. Fair
b. Good X d. Poor

11. Bridges (Coordinates From center of Bridge):
a. N/A c.
b. d.

12. Switches (Coordinates):
a. MG65518293 d.
b. MG67608431 e.
c. MG75509150 f.

13. Side Tracks (Location by Coordinates):
From: MG65908331 To: MG67618421
From: To:

14. Depots (Location:
From: MG65908331 To: MG67618421
From: To:

15. Warehouse (Location and Condition):
MG69458622

16. Marshalling Yards (Location and Condition):
N/A

17. Refueling Facilities (Location and Condition):
N/A

18. Remarks:
N/A

			ROLLING STOCK		
TIME	LOCATION	TYPE ENGINES	TYPE CARS	CONDITION	DIRECTION/LOAD
1300	MG75509150	Switch	Box Cars	Good	Standing/Empty

Air Observer: J. E. REDD, CAPT, USMC
VMO-6

SALUTE REPORT FORMAT

S - Size of enemy unit (estimate) and/or number of personnel.

A - Activity of observed personnel or unit (include direction and method/rate of movement if applicable).

L - Location (by grid coordinates or direction and distance from a known point).

U - Unit identification or uniforms/other recognizable characteristics.

T - Time (of sighting).

E - Equipment carried or in use by the enemy.

APPENDIX E

INFLIGHT REPORT

INFLIGHT REPORT	
Mission Call Sign	Originator Request Number
A. Target Description Target Location	
B. TOT/Time of Sighting/Intercept	
C. Results/Sighting Info	
D. Remarks	

EXPLANATORY NOTES

MISSION NUMBER.	The request number, frag order number, or directive number causing initiation of the mission.
Item A.	Target number, line number, or coordinates of the target or sighting being reported.
Item B.	Given as date-time group in GMT unless otherwise directed.
Item C.	Pilots/crews evaluation of expected results; concise narrative on sighting being reported.
Item D.	Includes information not mentioned above; e.g., enemy defenses encountered, ordnance remaining, battle damage, weather, additional details on reported sighting.

APPENDIX F

JOINT TACTICAL AIR RECONNAISSANCE/SURVEILLANCE MISSION REPORT (MISREP)

FORMAT (Not to be Transmitted)	EXAMPLE MESSAGE
1. MISREP NO: Always start of message.	1. MISREP 01-77
2. REFERENCE: Request, frag order, or directive causing initiation of the mission.	2. 01/A255
3. MISSION NUMBER NICKNAME: Self-explanatory.	3. BLUE EAGLE
4. LOCATION IDENTIFIER: Target number/coordinates, line number, or other target designator as applicable.	4. 18PSU18331900
5. TIME ON TARGET/TIME OF SIGHTING:	5. 231150Z
6. CREW'S EVALUATION OF EXPECTED RESULTS:	
a. Percent successful coverage.	6. a. 50 percent cvg.
b. Deviation from planned mission.	b. When applicable.
c. Crew's evaluation of significant sighting or incidents.	c. Concentrated light anti-aircraft artillery at target.
7. COVERAGE CONFIRMATION/SIGNIFICANT INFORMATION: The confirmation of imagery coverage of directed targets and significant information derived from initial interpretation of sensor results, if available.	7. Photo confirmed.

APPENDIX G

INITIAL PHOTO INTERPRETATION REPORT (IPIR), SUPPLEMENTAL PHOTO INTERPRETATION REPORT (SUPIR), AND MULTIMISSION IMAGERY PHOTO INTERPRETATION REPORT (MIPIR)

```
Cable
Line
Ref
     From:  IIIC
     To:    Requester

     BT

 (A) U N C L A S S I F I E D//NO3822//
 (B)                  SECTION 01 OF 01 SECTIONS
 (C) IPIR:123RTS SER:UV0157 PRJ: RD MSN:Z198A   DTZ:750227W
 (D) IMAGE QUALITY RANGE WAS GOOD TO EXCELLENT.  EIGHT OF TWELVE OF THE
     COLLECTION REQUIREMENTS WERE SATISFIED.

 (E) PART I.  MISSION HIGHLIGHTS

 (F) NO EVIDENCE OF SURFACE-TO-SURFACE MISSILES OR RELATED ACTIVITY WAS
     NOTED.  VEHICULAR AND TROOP MOVEMENT ACTIVITY IS VERY LIGHT.  NO
     ANTIAIR ACTIVITY OR REACTIONS TO THE RECONNAISSANCE PLATFORM WERE
     OBSERVED.

 (G) PART II.  SIGNIFICANT RESULTS

 (H)    A.  PERISHABLE ITEMS

 (I) ITM001:0213-00000 CAT:80000 AIRCRAFT IN FLIGHT
 (J)   REQ:              CTY:LA211929N061934E UTM:                MRG:
 (K)   STA:TRN      AI                        NRG:
 (L)   AOB:
        0001 CONF PA-23                       IN FLIGHT HDG NORTHEAST
 (M)   IRM:                   PAN FRM:1011,1012                   URG:
       AID:E AO CL BB         FRM:                    TOT:1045Z

 (H)    B.  NEW ITEMS

 (I) ITM002:0213UV0006 CAT:87200 PURTEE SAM SITE
 (J)   REQ:              CTY:LA210815N1055619E UTM:16TSU21357089  MRG:
 (K)   STA:UCO
 (L)   DES:SA-0 SITE IS BEING ESTABLISHED APPROX ONE HALF KM FROM THE
       BANK OF THE RED RIVER.  SITE CONSISTS OF SIX RVTD PSNS IN A STAR
       FORMATION.  FULL DESCRIPTION NOT YET POSSIBLE.  NO EQUIPMENT
       EXCEPT FOR CONSTRUCTION AND GROUND FORCE RELATED WAS IN THE AREA.
       GFW: 0008 CONF DUMP TRUCK
            0001 CONF ZAZ-7 CRANE
            0001 PROB A-2 TRACTOR
```

( ) Shown for explanation only; line identification is not shown on an actual message.

```
(O)     IMR:                         PAN FRM:976-980                  URG:
        AID:G AO SC SH BB                FRM:                   TOT:1039Z

(H)      C.  CHANGE AND OB ITEMS

(I)   ITM003:0213-02351 CAT:09100 WATERTON BARRACKS AREA
(J)     REQ:4A02316      CTY:LA221600N1053012E UTM:                   MRG:XYZ
(K)     STA:OPR      AI NAC DQ B1236  750102  NRG:NDA04/0014/5
(L)     RMK:PREVIOUSLY REPORTED U/I ARMORED EQUIPMENT HAVE NOW BEEN
        IDENTIFIED AS SWG-99 TANKS.
        GFW:AREA A-REGT AREA
            0103 CONF SWG099 TANK
            0092 CONF DTR-12 TRUCK
            0002 CONF MT-3 CRANE                ONE CRANE PKD NEXT TO //
                                                LOADING DOCK.
        GFW:AREA B-REGT AREA                     NAC DQ B1236    750102
        GFW:AREA C-REGT AREA                     NAC UP 298A     741209
        AAA:AREA C-AAA BN                        NAC UP 208A     741209
(M)     IMR:                         PAN FRM:500. 490-516              URG:234118
        AID:G AO CL BB                   FRM:135-138             TOT1025Z
        IDC:221615N1053045E  MPR:
(AN)  EQM:
```

( ) Shown for explanation only; line identification is not shown on an actual message.

EXPLANATORY NOTES FOR INITIAL PHOTO INTERPRETATION REPORT, SUPPLEMENTAL PHOTO INTERPRETATION REPORT, AND MULTIMISSION IMAGERY PHOTO INTERPRETATION REPORT

1. The IPIR/SUPIR/MIPIR format has been revised to accommodate the growth of automated intelligence systems. Detailed definitions and instructions for completing the IPIR, SUPIR, and MIPIR format are included in DIAM 57-5_. However, as a user guide to understanding imagery interpretation reports received, the following general definitions are provided. Cable line alphabetic references are cited to facilitate locating items in the sample message. Cable line references will not appear in actual imagery interpretation reports. Items in quotation marks are examples only and not included as standard parts of the actual format.

Cable Line Reference

(A) Self-explanatory.

(B) Self-explanatory.

(C) Report Type

IPIR. Initial photo interpretation report. A first-phase report covering a single mission.

SUPIR. Supplemental photo interpretation report. A second-phase, or more detailed, report covering a single mission.

MIPIR. Multimission imagery interpretation report. A second-phase report covering more than one mission.

Reporting Organization

"123RTS". The unit designator of the reporting organization will be given immediately following the type of report.

Report Number

SER:"UV0157". Reports will be numbered sequentially by the producing unit. A two-character alpha unit identifier as listed in DIAM 57-5_ will be used followed by a four-digit sequential number.

Reconnaissance Project Identification

PRJ:"RD". Two characters indicating the project of which this mission is a part. This stands for mission independent. Project identifiers may be derived from DIA reconnaissance program directives or DIAM 57-5-1.

Mission Number

MSN:"Z198A". The mission number will not exceed seven characters.

Date-Time Zone

DTZ:"750227W". Six characters; year year month month day day plus a one-character time zone.

(D) General Mission Statement

Free text reporting of information applying to the entire mission such as graphic reference, sensors, sensor on/off times (GMT) and coordinates, overall image quality, overall image scale range, other general mission data, or any other information deemed useful. If the objectives of the mission and the requesting authority can be given (consider length and classification), these will be included in the general mission statement. The general mission statement will be written as the mission is interpreted and appropriate data reported.

(E) Part I. Mission Highlights. Title for first major division of the report.

(F) Textual Data for Mission Highlights

Part I, Mission Highlights, allow for a concise free text statement of the significant information derived from the mission. It may be used to highlight individual items reported elsewhere in the message and to summarize information relative to a category of targets. Mission highlights may also be utilized for summations or trends of individual categories such as logistics studies or combat information of a significant nature.

(G) Part II. Significant Results. Title for second major division of the report.

(H) Categories of Items Which May be Reported

A. Perishable Items. This section is for items of perishable intelligence value, including transitory targets.

B. New Items. This section is for items upon which the reporting organization has no previous image-derived data.

C. Change and OB Items. This section is for items which reflect significant changes since the last available interpretation and targets for which order of battle information is required. For DOD combat reconnaissance programs, this section will include mission requirement objectives. A mission objective could also be reported under Perishable Items or Damage Assessment.

D. Bonus Items. This section includes significant changes to any known installation which is not a specified mission requirement objective.

E. Damage Assessment.	This section is for the description of damage to targets from nonnuclear attacks. This section will also include known strike objectives which are not damaged.

(I) Item Identification Data

Item Number

"ITM001" "ITM002" "ITM003"	Prefix plus a sequential number assigned to the item reported.

Basic Encyclopedia (BE) or Imagery Basic Encyclopedia (IBE) Number

"0213-00000" "0213UV0006"	A 10-character number which uniquely identifies a particular target or installation.

Functional Classification Code

CAT:"80000"	The numbering system as defined in DIAM 65-3-1 provides the function performed by the reported item.

Installation Name

"AIRCRAFT IN FLIGHT" "PURTEE SAM SITE" "WATERTON BARRACKS AREA"	If a BE installation name exists, it will be cited here. If no BE installation name exists, an appropriate name will be devised to reflect the place name and installation

(J) Other Identification Data

Requirement Number

REQ:"4A02316"	Entry identifies the requirement for collecting imagery of an item which is satisfied by the mission. Administrative number will be used, if available; otherwise, the space is left blank.

Geopolitical Entity

CTY:"LA"	A two-character country code from DIAM 65-5 is used.

Geographic Coordinates

"211920N1061034E"	Degrees, minutes, and seconds of latitude and longitude.

Universal Transverse Mercator

UTM:"16TSU21357089"	UTM coordinates will be given when known. A slash will be used if an eight-digit UTM coordinate cannot be determined. (Example: 18STU673/125/.)

Military District

MRG:"XYZ"	Military district code will be entered when applicable.

(K) Status/Activity Data

Status. STA:"TRN"	The status of the item will be reported in this manner. The following status codes are possible:
NEG.	Negated (nonexistent). Target/installation does not exist at or near the coordinates given in the requirement.
UCO.	Under construction. Target/installation is being initially constructed or repaired or construction action is underway that will structurally modify an established installation.
COM.	Complete. Target/installation appears to be externally complete. Appears capable of operating but operational status cannot be determined.
UNK.	Unknown. Status of target cannot be determined. Term is used in describing a target installation which may be interpreted to some degree although the status/activity cannot be determined because of limiting factors; e.g., imagery limitations, camouflage, jungle canopy, etc.
NOP.	Not operational. Essential elements of a target/installation are observed not to be in operation, equipment essential to the operation of the installation is either missing or observed not to be operational.
OPR.	Operational. Essential elements of a target/installation are observed in operation and/or key objects, vehicles, equipment, and other transportable items which are essential to the operation of the target/installation are present or other operational indicators are observed.
OCC.	Occupied. A completed target/installation and includes some but not all elements, objects, vehicles, and equipment essential for operational status. This term is also used in describing dummy installations that appear to be inhabited and contain some or all of the objects and equipment necessary to the accomplishment of its designed task.
DEC.	Deception. The sole purpose of the target is to deceive; e.g., dummy SAM sites.
UNP.	Unoccupied. Target/installation appears devoid of all objects, vehicles, or equipment, but remains in condition to be of immediate use.

ABN.	Abandoned. Target/installation is observed not in condition to be of immediate use.
RMV.	Removed. Target/installation has been razed, dismantled, or removed.
TRN.	Transitory. Fleeting targets to include vehicles, equipment, and personnel in transit as well as targets which appear to be only temporarily situated.
DMG.	Damaged. Target/installation has been damaged to some extent, but it may be restored to a usable status.
DST.	Destroyed. Target is so damaged that it cannot function as intended nor be restored to a usable condition. In the case of buildings, all vertical supports and spanning members are damaged to an extent that nothing is salvagable. In the case of bridges, all spans must be dropped and all piers must require replacement.
CNA.	Coverage not available. Usable coverage not available.

Exploitation Level

"AI" Appropriate code will be entered for the level of exploitation. The codes are as follows:

AI - IPIR
AS - SUPIR
MI - Mission Independent (MIPIR).

Significance

"NAC DQ B1236 750102" The significance code indicates the interpreter's assessment of the degree of change in the installation status, capability or function of the area or activity since previous mission coverage. If a significance code is entered, the referenced mission number and date will be entered. The codes are as follows:

NEW.	Newly detected activity.
SIG.	Significant change has occurred.
MIN.	Minor or minimum change has occurred.
UNK.	Significance of change is not known or change, if any, cannot be determined.
NAC.	No apparent change (implies no significant change). A NAC pertains to the last known pertinent remark or description available to the interpreter.

Reference Graphic

NRG:"NDA04/0014/5"	When a National Basic Reference Graphic (NBRG) exists, the number may be required for certain specific programs. In all other cases, the space will be left blank.

(L) Additional Interpretation Data

Additional photo interpretation data will be organized under one of the following codes:

DES.	Physical description. A DES will be accomplished when an installation is covered for first time; a basic description of the installation has not been previously written; the installation reflects a significant physical change (i.e., construction has been completed); or first reporting an installation as abandoned or destroyed.
RMK.	Remarks. This prefix will be used when providing less than a complete description of a known target and/or additional explanatory comments relating to status/activity.

Only a DES or RMK will be utilized for each entry, not both. If a NAC is entered on the status line, a DES will not be utilized.

The remark will include the project code and mission numbers of the coverages used to prepare the report in those cases where more than one mission is used.

For multiple mission reporting (MIPIR), the actual OB count will be taken from a representative mission flown during the reporting period.

Order of Battle Designations

MIS.	Missile and missile related equipment.
AOB.	Air order of battle.
NVL.	Naval and merchant vessels.
GFW.	Ground force weapons and equipment.
ELC.	Electronic order of battle. Communications, radar, and other electronic equipment.
AAA.	Antiaircraft order of battle. AAA weapons and AAA related equipment.
DMY.	Dummy. Includes all objects fabricated and installed for the purpose of deception.
OBJ.	Associated objects. Information relative to objects and equipment not reported under order of battle entries; e.g., crates, rolling stock, ground support equipment, etc.

Area Delineation

"GFW:Area B-Regt Area" Refers to area delineation of the National Basic Reference Graphic or other descriptive location data. When NBRG's are not available, locational reporting is permitted; e.g., assembly area. Multicoverage dates may be included following each locational entry or as unique entries.

Insignificant Change Coding

"NAC DQ B1236 750102" If no significant change since the last pertinent OB reported from adequate, complete coverage, NAC may be used. NAC will be followed by the project code, mission number, and mission date.

(M) Imagery Reference Data

Imagery Reference. IMR A minimum of one IMR line is required; however, more lines may be required to indicate different day coverage. For multiple mission reporting (MIPIR), only those missions which contributed to a specific readout are entered on the IMR line. Initial information in the IMR line may include date of coverage, project code, mission number, and camera station. The following coded items may then be used:

FRM: Frame number. Frame of photo mission (Example: FRM:1011,1012).

SLR: Side looking radar.

INF: Thermal infrared.

URG: Universal reference grid. Six-position URG coordinates (see DIAM 57-23).

AID: Additional imagery data. AID is used to provide interpretability data. Interpretability codes are as follows:

E	Excellent
G	Good
F	Fair
P	Poor

Extent of coverage and mode:

A	Complete coverage/stereo
B	Complete coverage/partial stereo
C	Complete coverage/mono
D	Partial coverage/stereo
E	Partial coverage/partial stereo
F	Partial coverage/mono

Type of coverage:

O	Oblique
V	Vertical

Weather conditions:

CL	Clear
SC	Scattered clouds
HC	Heavy clouds
HA	Haze

Other conditions:

SN	Snow
SH	Shadow
OL	Degrading obliquity
SD	Semidarkness
BL	Blurred/image
TR	Terrain masking
HD	Heavy smoke/dust

Type of film:

B	Black and white
C	Natural color
G	Green record
I	Color rear infrared
R	Red record
T	Thermal infrared
S	Radar
N	Nonstandard

(Note: For stereo or partial stereo, two letters will be used--one for the first frame and one for the second; e.g., BB, black and white on both frames.)

FRM: Additional frame reference for a given target.

TOT: Time information. Time over target; four characters plus time zone indicator. (Example: TOT:"1045Z".)

IDC: Imagery derived coordinates (latitude and longitude) derived by comparing imagery with a map or chart.

MPR: Map reference.

PPC: Precision photo derived coordinates.

(N) Part III. Other Results. Title for third major division of the report; as indicated in the sample message, Part III may be omitted.

(O) A. Mission Requirements. Provides for reporting items/targets not properly placed in Part II.

(P) Categorization of Target Entries

An introductory statement which categorizes a set of like items to increase readability. (Example: The following SA-2 sites are unoccupied (LIST).)

2. Other items in Part III can be understood from the codes given earlier. DIAM 57-5 contains more detailed information on the structure of Part III.

3. Part IV of the format will contain collections objectives satisfied and not satisfied, plus a textual statement indicating reason for non-satisfaction. Items contained in Part IV can be understood from the codes listed earlier.

APPENDIX H

JOINT TACTICAL ELECTRONIC WARFARE REQUEST FORM (ELECTRONIC WARFARE SUPPORT MEASURES/ELECTRONIC COUNTERMEASURES MISSIONS)

A	Request # 1. ☐ Precedence 2. ☐ Priority	FROM TO
B	MAP REFERENCE: Producer 1. AMS 2. ACIC 3. NAVOCEANO 4. Other (specify) ______ Series ______ Date ______	☐ Approved ☐ Disapproved
C	TYPE EW MISSION SUPPORT REQUESTED: $\boxed{1}$ ESM $\boxed{2}$ ECM $\boxed{3}$ Combination	By/Reason
D	MISSION TO BE SUPPORTED (DESCRIBE): 1. Nature of Mission: ______ 2. Route of Travel (*Altitudes): ______ 3. Timing: ______ 4. Force Size: ______	SENT TIME BY RECEIVED TIME BY CHECKED BY
E	ESTIMATED THREAT TO EW SUPPORT MISSION: 1. ______ 2. ______ 3. ______ 4. ______ 5. ______ 6. ______ 7. ______ 8. ______ 9. ______	
F	ESTIMATED EOB TO AFFECT MISSION: (Type, Electronic Frequencies, Location)	ACKNOWLEDGED 1) ______ 2) ______
G	DESIRED RESULTS: 1. ESM a. Area Search ______ b. Specific Search ______ 2. ECM ______	3) ______ 4) ______

* Applicable or when known.

H	COORDINATING INSTRUCTIONS: 1. *Mission Rendezvous ____________ 2. Mission Contact (C/S, Freqs): a. Primary: ____________ b. Secondary: ____________ 3. Friendly Force(s) Possibly Affected: a. Unit(s): ____________ b. Address: ____________	COORDINATION 1) ____________ 2) ____________ 3) ____________ 4) ____________
I	REPORTS: 1. INFLTRPT C/S ______ FREQ ______ 2. MISREP ______ 3. TESM ______ 4. Other ____________	COORDINATED ☐ Artillery ☐ AIR DEF ☐ AVN ☐ NGF
J	REMARKS/SPECIAL INSTRUCTIONS: A JAMMING FREQ RESTRICTIONS	
K	1. PLANNED AIRSPACE COORDINATION AREA A IS NOT B NUMBER 2. IN EFFECT A (from time) ______ B (to time) ______ 3. LOCATION A ______ (From coordinates) B ______ (To coordinates) 4. WIDTH (Meters) 5. ALTITUDE/VERTEX A ______ (Maximum/VERTEX) B ______ (Minimum)	Requesting Unit Notified By DTG By ☐ Accept ☐ Refuse REASON

* Applicable or when known.

AIR MISSION DATA

L

1. MISSION NO	2. AIRCRAFT C/S	3. NO/TYPE ACFT

4. EST/ACT TAKEOFF	5. RENDEZVOUS (Coord/NavFix)
6. MISSION CONTACT C/S ________ Freq ________	7. MISSION TIMING TOT ________ Duration ________

8. ESM

A Area of Search

B Signals to be Searched

9. ECM

A Profile: ____

____

____

B Type Signals/Freqs for ECM: ________________________________

C Chaff/Decoy Drop: ______________________________________

10. INFLT RPT C/S ________ Freq ________	11. PLANNED AIRSPACE COORDINATION AREA (BLOCK K)

12. REMARKS

EXPLANATORY NOTES FOR JOINT TACTICAL ELECTRONIC WARFARE REQUEST FORM

NOTE: This form combines both electronic warfare support measures and electronic countermeasure request requirements. It will, thereafter, not always be appropriate to complete every line item. The requester should complete as many line items as he has information for, regardless of the type mission requested.

Title and Element(s)	Explanation
Line A	
Request Number	As directed.
1. Precedence	1. Indicate the requester's assignment relative to his other requests stated numerically in descending order of importance.
2. Priority	2. Use numerical designation below to define the tactical situation.

Priority No.	Priority	Definition
1	Emergency	Targets which require immediate action and precedence over all other categories of mission priority.
2	Priority	Targets which require immediate action and take precedence over routine targets.
3	Routine	Targets of opportunity targets which do not demand urgency in execution

Title and Element(s)	Explanation
Line B	Self-explanatory.
Line C	Self-explanatory.
Line D	
Mission to be Supported.	Describe, in sufficient detail, the profile and specifics of the mission needing support. The amount and type of support will be determined, to a large extent, from the information provided here.

Line E	
Estimated Threat to Mission	List the known and suspected enemy order of battle that will probably affect the mission to be supported.
Line F	Self-explanatory.
Line G	
Desired Results	Describe the objectives of the requested support.
1. ESM	Include EEI that collection is responding to. When requesting Specific Search, provide EEI on emitter to be collected on; i.e., radio frequency (RF), pulse repetition frequency (PRF), pulse duration (PD), scan type (SCAN), scan duration/rate (SD/R), and other significant information.
2. ECM	Designate specific electronic countermeasure effects desired and in relation to lines E and F when applicable. Identify frequencies to be affected when they are known. Tactics and employment methods may be recommended.
Line H	
Coordinating Instructions	
1. Mission Rendezvous	Designate by coordinates or navigation system fix when mission requires inflight rendezvous.
2. Mission Contact	List the call sign(s) and communication frequencies for the supported agency to be contacted by mission aircraft when contact is necessary.
3. Friendly Force(s) Possible Affected	If there is a chance that the effects of the requested mission will interfere with other operations, provide information on the units that may be affected; to include description of interference when known.
Line I	Self-explanatory.

Line J	Self-explanatory.
Line K	
1. Planned Airspace Coordination Area A. Is Not B. Number	1. Safety measures for EW support mission. The planned ACA establishes airspace/surface area that is reasonably safe from friendly, surface-delivered, nonnuclear fires. The planned ACA provides a warning of aircraft of the parameters of surface-delivered fire in a specific area. A plan number is issued, as appropriate.
2. In Effect A. From time B. To time	2. Establishes the time period that the applicable plan will be in effect.
3. Location	
A. From--coordinates B. To--coordinates	A. Military grid coordinates by bearings and distances from a known navigation aid.
4. Width (Meters)	From either side of the centerline defined by the above coordinates. (May not apply to the restrictive air plan.)
5. Altitude/VERTEX (use subitem A for VERTEX only entry).	
A. Maximum/VERTEX B. Minimum	Given in mean sea level (MSL) altitude; altitude above sea level.
Line L (To be filled out by mission tasking agency)	Self-explanatory
ACTIONS COLUMN ALONG RIGHT EDGE	
APPROVED/DISAPPROVED	Indicate approval action by requester.
SENT	Initials of sender and time sent.
RECEIVED	Initials of receiver and time received.

CHECKED BY	Indicate agencies (persons) having reviewed the request after receipt. This may lead to further action requiring use of top blocks by higher echelon.
ACKNOWLEDGED	Use as locally directed or as necessary.
COORDINATION/COORDINATED	Self-explanatory.
REQUESTING UNIT NOTIFIED BY	Indicate person who notified the requester of action being taken and time notified.
AIR ACTION	Indicate person who received approved request and time received. Indicate whether or not mission will be tasked and reason for refusal.

APPENDIX I

JOINT TACTICAL ELECTRONIC WARFARE SUPPORT MEASURES/ELECTRONIC COUNTERMEASURES REPORT

HEADING

PRECEDENCE

ORIGINATING AGENCY/UNIT

ACTION ADDRESSEES

INFORMATION ADDRESSEES

SECURITY CLASSIFICATION/CODE WORD OR NICKNAME

TESM (Number)/DATE-TIME GROUP (GMT)/MONTH/YEAR

NOTE: Report numbers will be numbered consecutively until the operation is terminated or for the duration of the calendar year.

Mission Description

a. Mission number.

b. Originator's request number.

c. Mission date (date-time group (GMT)/month/year).

d. Reference (operation/frag order number).

e. Site location (give geographic coordinates of unit submitting the report).

PART A. FOR ELECTRONIC WARFARE SUPPORT MEASURES (ESM) REPORTING

1. Flight Profile (if applicable) (report the coordinates, DTG, and altitude of each major turning point along flight route).

a. Position b. DTG c. Altitude

2. Ground/Naval Surface Profile (if applicable) (report the coordinates and DTG of the EW installation/unit providing support and whenever position is changed).

a. Position b. DTG

3. Emitter Location Identifier

a. Location (report using plan identification number (PIN) or report the location in geographic minutes north, south, east, or west of a known PIN).

b. True Bearing (give true bearing from site to EW support unit or EW support aircraft at time signal data were recorded).

b. Accuracy (report probable accuracy of emitter location).

(1) Category A. Within a 1-nautical mile radius of the location being reported.

(2) Category B. Within a 3-nautical mile radius of the location being reported.

(3) Category C. Within a 4-nautical mile radius of the location being reported.

(4) Category D. Within a 10-nautical mile radius of the location being reported.

(5) Cannot reliably be located and may be beyond a 10-nautical mile radius.

4. Time of Intercept (report as six-digit date-time group. If multiple cuts, give time on, time off).

5. Type of Emitter (report standard nickname for emitter if known; e.g., TOKEN).

6. Emitter Employment (e.g., fire control, early warning. etc.).

7. Emitter Characteristics (report signal characteristics of emitter).

a. Radio Frequency (RF).

b. Pulse Repetition (PRF).

c. Pulse Duration (PD).

d. Scan Type (SCAN).

e. Scan Period (SP).

8. Remarks (include other pertinent information data derived from readout of the intercept signal).

NOTE: More than one electronic intercept may be included in one report. All information pertaining to one intercept should be reported before starting on information on the next one.

PART B. FOR ELECTRONIC COUNTERMEASURES (ECM) REPORTING

1. Flight Profile (if applicable) (report the coordinates, DTG, and altitude of each major turning point along flight route).

a. Position b. DTG c. Altitude

2. Ground/Naval Surface Profile (if applicable) (report the coordinates and DTG of the EW installation/unit providing support and whenever position is changed).

3. ECM On-Off Time.

4. Type of ECM Provided (jamming, repeater, chaff, decoys, etc., include quantity of chaff/decoy units expended).

5. Type of Emitters Affected (report standard nickname for emitters if known; e.g., FANSONG or communications. For communications, list frequencies affected).

6. Frequency Limits of Jamming Bandwidths Used.

7. Emitter Characteristics (report any unusual signal characteristics noted during ECM support activity; e.g., change in emitter frequency, PRF, scan rate, emitter off, etc.).

8. Remarks (include other pertinent information data which could provide indications of ECM effectiveness).

NOTE: More than one ECM event (ECM on-off) may be included in one report. All information pertaining to one ECM event should be reported before starting on information on the next one.

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1. JOINT PUBLICATIONS

JCS Pub 1, Department of Defense Dictionary of Military and Associated Terms
JCS Pub 2, Unified Action Armed Forces (UNAAF)

2. DEFENSE INTELLIGENCE AGENCY MANUALS

DIAM 57-5A, DOD Exploitation of Multisensor Imagery
DIAM 65-3-1, Intelligence Data Handling System

3. LANDING FORCE MANUALS

LFM 01, Doctrine for Amphibious Operations
LFM 02, Doctrine for Landing Forces
LFM 04/NWP 17, Doctrine and Procedures for Airspace Control in the Combat Zone

4. FLEET MARINE FORCE MANUALS

FMFM 2-1, Intelligence
FMFM 2-3, Signals Intelligence/Electronic Warfare Operations (U)
FMFM 3-3, Helicopterborne Operations
FMFM 4-2, Amphibious Embarkation
FMFM 5-1, Marine Aviation
FMFM 5-3, Assault Support
FMFM 5-4, Offensive Air Support
FMFM 5-5, Antiair Warfare
FMFM 5-5C, Employment of the Forward Area Air Defense Battery
FMFM 7-1, Fire Support Coordination
FMFM 7-2, Naval Gunfire Support
FMFM 7-4, Field Artillery Support
FMFM 8-1, Special Operations
FMFM 8-2, Counterinsurgency Operations
FMFM 10-1, Communications

5. U.S. NAVY PUBLICATIONS

NWP 3, Naval Terminology
NWP 4, Basic Operational Communications Doctrine (U)
NWP 11, Naval Operational Planning (U)
NWP 22-2, Supporting Arms in Amphibious Operations
NWP 22-3, Ship-to-Shore Movement
NWP 33, Electronic Warfare (U)
NAVAIR 01-60GCB-1, OV-10A NATOPS Flight Manual
NAVAIR 01-60GCB-1T, OV-10A Tactical Manual
NATOPS Air Refueling Manual
ATP 27, Offensive Air Support Operations

6. U.S. ARMY FIELD MANUALS

FM 30-20, Aerial Surveillance-Reconnaissance, Field Army

8. MARINE CORPS ORDERS

MCO 3120.3, The Organization of Marine Air-Ground Task Forces
MCO P3500.8, Aviation Training and Readiness Manual

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